

Final

Site Inspection Addendum

Fort Meade Feasibility Study and Remedial Investigation/Site Inspection Fort George G. Meade, Maryland

Prepared for:

U.S. ARMY ENVIRONMENTAL CENTER
ABERDEEN PROVING GROUND, MARYLAND 21010

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List of Acronyms and Abbreviations

ADL Arthur D. Little, Inc.

AFFF Aqueous Firm Forming Foam
ASL Active Sanitary Landfill

ASTM American Society for Testing and Materials

ATEC Associates, Inc.

AWQC Ambient Water Quality Criteria
BRAC Base Realignment and Closure Act

CERCLA Comprehensive Environmental Response, Compensation, and Liability

Act

CFD Clean Fill Dump

CFR Code of Federal Regulations

COC Chain-of-Custody

COMAR Code of Maryland Regulations
COR Contracting Officer's Representative

CRL Certified Reporting Limit

DCE Dichloroethene

DPDO Defense Property Disposal Office (currently known as DRMO)

DOO Data Quality Objective

DRMO Defense Reutilization and Marketing Office

DSY DPDO Salvage Yard ECD Electron Capture Detector

EHSI Environmental Hazards Specialists International, Inc.

EIS Environmental Impact Statement
EMO Environmental Management Office
EOD Explosive Ordnance Disposal

EPA United States Environmental Protection Agency

ER-L Effects Range - low
ER-M Effects Range - median
FGGM Fort George G. Meade
FS Feasibility Study
FSP Field Sampling Plan

FTA Fire Training Area
GC Gas Chromatography

GFAA Graphite Furnace Atomic Absorption Spectrophotometer

HNO₃ Nitric Acid
H₂SO₄ Sulfuric Acid
HCL Hydrochloric Acid
HHA Helicopter Hangar Area

HHRA Human Health Risk Assessment

HNU Inc., Manufacturer of Photoionization Detector

HSA Hollow Stem Auger

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ID Site Identification
II. Inactive Landfill

IRDMIS Installation Restoration Data Management Information System

MCL Maximum Contaminant Level
MCLG Maximum Contaminant Level Goal

MDNR Maryland Department of Natural Resources

MGS Maryland Geological Survey

MS/MSD Matrix Spike/Matrix Spike Duplicate

MSL Mean Sea Level NA Not Analyzed

NAD North American Datum NAPL Non Aqueous Phase Liquid

ND Not Detected No. Number

NOAA National Oceanic and Atmospheric Administration

ODA Ordnance Demolition Area

OSHA Occupational Safety and Health Administration

PA Preliminary Assessment PCB Polychlorinated Biphenyl

PCE Tetrachloroethene

PID Photoionization Detector

PWRC Patuxent Wildlife Research Center QA/QC Quality Assurance/Quality Control

QAP Quality Assurance Plan OCP Quality Control Plan

RCRA Resource Conservation and Recovery Act
RI/FS Remedial Investigation/Feasibility Study

RI Remedial Investigation

RIA Remedial Investigation Addendum

ROD Record of Decision
SI Site Investigation

SIA Site Investigation Addendum

SLI Site Location Identity

SMCL Secondary Maximum Contaminant Level

SOP Standard Operating Procedure

SOW Scope of Work

SPT Standard Penetration Test

SVOC Semivolatile Organic Compound

SW Solid Waste

TAL Target Analyte List
TCA Trichloroethane
TCE Trichloroethene

TCL Target Compound List

TCLP Toxicity Characteristic Leaching Procedure

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TDS Total Dissolved Solids

TEPS Total Environmental Program Support

TIC Tentatively Identified Compound TPHC Total Petroleum Hydrocarbons

USACE U.S. Army Corps of Engineers

USAEC United States Army Environmental Center USAEHA U.S. Army Environmental Hygiene Agency

USATHAMA United States Army Toxic and Hazardous Materials Agency

USC Unique Sample Code

USCS Unified Soil Classification System

UST Underground Storage Tank
UTM Universal Transverse Mercator

UV Ultraviolet

UXO Unexploded Ordnance
VOA Volatile Organic Analysis
VOC Volatile Organic Compound

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Executive Summary

This Site Investigation Addendum (SIA) Report was prepared as part of the SIA investigation conducted by Arthur D. Little, Inc., for the U.S. Army Environmental Center (USAEC) at the Fort George G. Meade (FGGM) Army base in Anne Arundel County, Maryland. The principal objective of this investigation was to evaluate the potential for chemical releases or contamination in suspected areas and to address data gaps identified during the 1990 Site Investigation (SI). Six sites were included in the SIA as having data gaps that required addressing: the DPDO Salvage Yard (currently known as the DRMO) and Transformer Storage Area (DSY), the Fire Training Area (FTA), the Helicopter Hangar Area (HHA), Inactive Landfill No. 2 (IL2), the Ordnance Demolition Area (ODA), and Soldiers Lake (SL).

The following tasks were performed to complete the SIA:

- Review of documents provided by USAEC containing information regarding historical activities and investigations at each site
- Completion of nine soil borings: two at the DSY, three at the FTA, one at the HHA, and three at the ODA
- Installation and development of nine ground water monitoring wells: two at the DSY, three at the FTA, one at the HHA, and three at the ODA
- Collection of surface water/sediment samples: five surface water/sediment pairs at the HHA, and two surface waters at SL.
- A location and elevation land survey of all new monitoring well locations
- Collection of water level measurements from newly installed monitoring wells at each site and the existing monitoring wells and piezometers
- Collection and analysis of soil and ground water samples in areas of concern as well as background locations at each site
- Review and interpretation of analytical results
- Identification of data gaps
- Reduction and review of all data obtained during the investigation, generation of figures and tables, and completion of the SIA report

The principal findings from this investigation are as follows:

DPDO Salvage Yard and Transformer Storage Area: Halogenated volatile organic compounds (VOCs) continue to be detected in the shallow monitoring wells located along the southern boundary of the property. The source and extent of the contamination is still not known. A significant difference in depth to ground water between the westernmost sampling point -- location of highest VOC concentrations -- and neighboring monitoring wells makes it difficult to interpret the direction of ground water flow with certainty. Low concentrations of PCBs

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were detected in the transformer storage area; however, these results do not reflect the concentrations detected during a previous investigation.

- Fire Training Area: VOC and metals contamination in the downgradient sampling location indicate that fire fighting activities have impacted the ground water quality. The extent of contamination is not known. The primary direction of ground water flow could not be determined with any degree of certainty because of the shallow gradient.
- Helicopter Hangar Area: Surface water and sediment data indicate that the HHA
 is not impacting the Little Patuxent River. The surface water data are below
 Ambient Water Quality Criteria (AWQC); the sediment data are below National
 Oceanic and Atmospheric Administration (NOAA) guidelines.

Multiple sources may exist for ground water. Petroleum related compounds are present particularly in the area of the former underground storage tanks (USTs). Closer to the hangar, metals are also present in ground water at concentrations above maximum contaminant levels (MCLs).

- Inactive Landfill No. 2: Total metals continue to exceed their MCLs in ground water. The number of MCL exceedences increased from the SI to the SIA. It is not understood whether this increase is due to seasonal or natural variability. Concentrations increase downgradient of the source, indicating contaminant migration.
- Ordnance Demolition Area: VOCs and secondary explosives are present in the ground water above MCLs and Health Advisory limits. There is evidence that these compounds are migrating toward the south in ground water. The source of the VOC contamination is not known. The extent of the VOC or explosives contamination has not been defined.
- Soldiers Lake: Metals and pesticides are present in surface water at Soldiers
 Lake. The metals are generally within previous ranges and none exceed AWQC.

 The pesticides are present at low concentration and have decreased from the SI.

The USAEC is conducting Remedial Investigations at the DPDO, FTA, HHA, IL2, and ODA which will include detailed evaluations of site conditions. Work plans for these efforts are expected to be released inMay and October 1995, and detail the sampling and analysis programs for the sites. Although not addressed within this study, a Remedial Investigation/Feasibility Study will be conducted at Inactive Landfill 1 and Inactive Landfill 3.

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1.0 Introduction

1.1 Purpose of Report

This Site Inspection Addendum Report has been prepared to address the Site Inspection portion of the Feasibility Study (FS) and Remedial Investigation/Site Inspection (RI/SI) activities at Fort George G. Meade. It has been prepared under Delivery Order No. 009 and a Change Order dated July 15, 1993, for the U.S. Army Environmental Center (USAEC), formerly known as the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA). This report fulfills the requirements of deliverable ELIN A004 under Delivery Order 0009 of the Total Environmental Program Support (TEPS) contract DAAA15-91-D-0016.

The purpose of this Site Inspection Addendum (SIA) report is to report the findings of Arthur D. Little's SIA investigation. The overall purpose of an SI is to evaluate if chemical releases or potential contamination has occurred at suspected sites and to determine if further investigation is warranted. This study is an addendum to a previous SI and addresses data gaps remaining from or identified in that document. Six sites at Fort George G. Meade (FGGM) are included in the SIA:

- DPDO Salvage Yard and Transformer Storage Area
- Fire Training Area
- Helicopter Hangar Area
- Inactive Landfill No. 2
- Ordnance Demolition Area
- Soldiers Lake

A second study, a Remedial Investigation Addendum (RIA) was conducted concurrently with the SIA. Two sites, the Active Sanitary Landfill and the Clean Fill Dump, are included in that study. The results of the RIA are reported in a separate document. However, some basewide data, such as geology, general hydrogeology, and background soil concentrations, are reported in both reports.

Because this document is an addendum to the original SI (EA Engineering, Science and Technology, 1992), it does not include all the data from that document. When appropriate, data from the SI are summarized here or are used for comparison with the newer data. However, for a complete account of the SI, refer to that document.

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1.2 Site Background

1.2.1 Site Location and General Description

FGGM is located in Anne Arundel County, Maryland, between Washington, D.C., and Baltimore, Maryland (Figure 1-1), and includes approximately 13,000 acres. The closest town is Laurel, Maryland, located less than five miles to the west.

The Baltimore-Washington Parkway and Route 197 are located west and south of FGGM, respectively. Route 198 runs across the facility east to west and Route 175 cuts across the facility's northeast corner. The Baltimore and Ohio Railroad has tracks across FGGM's northern half and Amtrak rails run along the southeast border. The Universal Transverse Mercator (UTM) coordinates, for zone 18, for the furthest extents of the base are 4332400 north, 0352100 east, 4321900 south, and 0341600 west (USCS, 1979; Defense Mapping Agency, 1976).

The base has been a permanent U.S. Army installation since 1917. The installation contains administration, recreational, and housing facilities, as well as limited training areas and firing/combat ranges. The FGGM community consists of a residential population and daytime work force of approximately 20,000 (EA Engineering, Science and Technology, 1992).

Five sites are in the SIA. Table 1-1 summarizes their names, abbreviations, and location on the base. The sites are shown on Figure 1-2.

1.2.2 Site History and Previous Investigations

In 1988, the U.S. Army Base Realignment and Closure Act (BRAC) recommended that 9,000 acres of the 13,000-acre facility be closed or excessed. This 9,000-acre area encompassed the southernmost two-thirds of the installation. On October 1, 1991, the Army transferred 7,600 of the 9,000 acres to the Department of the Interior, specifically the Patuxent Wildlife Research Center (PWRC) (Argonne National Laboratory, 1989). The remaining 1,400 acres proposed to be excessed consist of approximately 1.000 acres of woodlands and wetlands and approximately 400 acres associated with the Tipton Army Airfield. An additional 500 acres are proposed for transfer to the PWRC; however, this transfer has not yet been completed. There has been no determination yet about the transfer of the Tipton Army Airfield and additional acreage. Figure 1-2 shows the 7,600 acres transferred to PWRC and 500 acres proposed for transfer.

Numerous environmental investigations have been conducted at FGGM since BRAC, including an Enhanced Preliminary Assessment (Argonne National Laboratory, 1989), a study by the Maryland Department of Natural Resources (MDNR), an Environmental Impact Statement (EIS) (draft and final) (Rogers et al., 1990, 1991), a Wetland Identification Study (RGH/CH2M Hill, 1991), a Remedial Investigation (EA

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Engineering, Science and Technology, 1992a), and a Site Inspection Study (EA Engineering, Science and Technology, 1992b).

The Enhanced PA includes a review of all available records related to air, soil, surface water, and ground water, and identifies six areas of concern at FGGM: active and inactive landfills, underground storage tanks, asbestos, unexploded ordnance, surface water, and burning grounds.

MDNR conducted an evaluation of the surplus property in January 1990. The study describes the natural features and land uses associated with the 9,000 acres to be excessed from FGGM and discusses the degree of development of the retained land.

In January 1990, an EIS for FGGM, Fort Holabird, Maryland, and Fort Belvoir, Virginia, was prepared by Rogers, Golden & Halpern, Inc. (RGH). The EIS focuses on the affected environmental areas of these installations. The EIS describes the existing conditions of FGGM's 9,000 acres slated to be excessed and evaluates the consequences of the use/reuse scenarios.

In January 1991, a wetland identification study was prepared by RGH/CH2M Hill, Inc. to complete the study of the closure and use/reuse alternatives for the 9,000-acre parcel at FGGM (RGH/CH2M Hill, January 1991). The report describes the methods used to identify wetlands on the parcel and presents a map of wetlands distribution.

A Final EIS for the comprehensive base realignment and partial closure for FGGM and Fort Holabird was prepared by the U.S. Army Corps of Engineers, Baltimore District, in July 1991. This report focuses on the environmental and socioeconomic impacts associated with the planned base realignment and partial closure at FGGM and Fort Holabird. The EIS covers only 1,400 acres of the 9,000-acre parcel at FGGM; the remainder of the parcel was awaiting transferral to the PWRC at the time of the final report.

A Draft Remedial Investigation (RI) report was prepared by EA Engineering, Science and Technology, Inc. in November 1991. The RI focuses on the active sanitary landfill (ASL) and the clean fill dump (CFD). The final RI was completed in October 1992 (EA, October 1992).

A Draft Site Inspection (SI) report was submitted by EA Engineering, Science and Technology in January 1992. This report discusses conditions at the helicopter hangar area (HHA), four inactive landfills, the DPDO salvage yard (DSY), the fire training area (FTA), the ordnance demolition area (ODA), underground storage tanks, and asbestos. The final SI was submitted in October 1992 (EA, October 1992).

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1.2.3 Site Description

1.2.3.1 Physiography and Surface Water. FGGM is located in the Atlantic Coastal Plain physiographic province, which is characterized by low rolling uplands and low-gradient streams. The Coastal Plain is underlain by a thick wedge of unconsolidated sediments that dip and thicken to the southeast. The sediment wedge thins to the west along the "fall line," the line separating the Coastal Plain and Piedmont geographic provinces. The land surface elevation at FGGM ranges from approximately 65 to 300 feet.

FGGM is located in the Patuxent River watershed. The Little Patuxent River flows southeast across FGGM along a broad, flat river valley with extensive wetlands. The Little Patuxent flows across the northeastern corner of FGGM and into the Patuxent River, which eventually empties into the Chesapeake Bay.

The Little Patuxent flows along the borders of two SIA and one RIA sites: the HHA, the IL2, and the CFD. The Midway and the Franklin Branches of the Little Patuxent flow south across the northern half of the facility and join to form the Rogue Harbor Branch. Several other unnamed tributaries flow across the site.

Quaternary river terrace deposits are present in some areas of FGGM and consist primarily of interbedded sand and gravel with some silt and clay. The terrace deposits are found near the CFD at an average thickness of 25 feet. Marsh deposits are also found at the installation and include interbedded silt, clay, and sand with organic matter.

There are two lakes at FGGM: Burba Lake is located along the Franklin Branch and Soldiers Lake is located along the Rogue Harbor Branch. There are also two small surface water retention ponds at the base of the ASL.

1.2.3.2 Surficial and Bedrock Geology. The Costal Plain province is characterized by a thick wedge of unconsolidated coastal sediments that were deposited from the Triassic to the Quaternary geologic periods. The formations that make up the wedge dip toward the southeast and outcrop in roughly north-south trending bands (Maryland Geologic Survey, 1968). Regional geology is illustrated on Figure 1-3.

The unconsolidated deposits present at FGGM are from the Potomac Group. The Potomac Group consists of, from youngest to oldest, the Patapsco, Arundel, and Patuxent Formations, for a total thickness of approximately 600 feet. The formations were formed as fluvial and lacustrine deposits and consist of interbedded sand, silt, and clay layers. A stratigraphic column for Anne Arundel County is shown in Figure 1-4.

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Based on site drilling logs, primarily from the ASL, the upper section of the Patapsco Formation consists of mottled, medium fine to silty sand in various colors: yellow brown, yellow orange, light brown, and gray. The thickness of this layer ranges from 1 to 40 feet at the ASL. This upper section of the Patapsco is not continuous across FGGM and appears to pinch out along the western portion of the ASL. It is likely, based on drilling logs and relative spacial position, that the wells at the ODA are also screened in the upper Patapsco.

A fairly sharp contact exists between the upper and middle sections of the Patapsco Formation. The middle section of the Patapsco Formation is a thick, hard, highly plastic, mottled clay. Depth to the clay layer ranges from 1 to 40 feet below grade. The middle section is very close (<5 feet) to the ground surface along the western boundary of the ASL and along the stream flowing west from the ASL. The proximity of the surface of the middle section to the ground surface indicates that the upper section is pinching out. The middle layer has a mean thickness of 50 feet and ranges up to at least 102 feet at the ASL, where it was completely penetrated. Lenses of very fine silty sand, varying from 2 to 16 feet in thickness, are not uncommon in the middle section.

The transition between the middle and lower sections of the Patapsco Formation is fairly gradual. There is approximately 15 feet of alternating silty sands and silty clays before the transition to the lower Patapsco (medium fine sand with trace clay). The lower section of the Patapsco Formation is a medium fine, silty sand that grades downward into a coarse medium sand with minor silt. The colors observed in this layer include pale to dark yellowish orange, dark brown, and dark yellow. The soil boring logs from the deep wells at the ASL and the shallow wells at the FTA and DSY are representative of this layer. The reported regional thickness ranges from 80 to 100 feet. Depth to the layer at FGGM is approximately 45 feet below grade.

The Arundel Formation is approximately 250 feet thick and consists of massive beds of red, brown and gray clay with more permeable layers in some areas.

The Patuxent Formation is the oldest of the unconsolidated deposits and is composed of sand and gravel with some silty clay and clay. This formation is the shallow layer along the western boundary of FGGM and lies above crystalline bedrock. The Patuxent, like the rest of the unconsolidated deposits, slopes to the southeast.

The Patuxent Formation rests unconformably above crystalline bedrock. The bedrock, which is Precambrian to early Cambrian, consists of igneous and metamorphic rocks (Hansen and Edwards, 1986). The bedrock outcrops in the Piedmont region northwest of the base. The primary rock types found along the fall line are metavolcanics such as amphibolite, schist, and serpentinite, and belong to the Baltimore Mafic Complex.

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In summary, FGGM is underlain by a wedge of unconsolidated deposits that thicken and dip to the southeast. The deposits include alternating formations of sand and gravel with silty clays. Underlying the wedge is Precambrian to early Cambrian crystalline bedrock. Depth to bedrock at FGGM is unknown and varies regionally.

1.2.3.3 Hydrogeology. The Potomac Group is composed of three separate and distinct aquifers in the vicinity of the base. The aquifers are known as the upper and lower Patapsco and the Patuxent aquifers. The middle confining layer of the Patapsco Formation and the Arundel Formation act as confining layers separating each of the aquifers (Figure 1-5). All three aquifers are confined on a regional scale but act as water table aquifers in areas where the confining layers do not exist.

The upper Patapsco, where it exists at FGGM, is an unconfined water table aquifer. This layer is present at the ASL but has not been identified at other sites at FGGM. It may be present at the CFD, but the identification has not been confirmed. The regional direction of ground water flow is to the southeast. However, due to mounding, ground water flow in the upper Patapsco at the ASL varies with the topography and can be east, south, or west. The hydraulic conductivity for this aquifer, measured at the ASL, ranges from $3x10^{-5}$ to $6x10^{-3}$ cm/sec. The mean water level elevation at the ASL is 145 feet above mean sea level (MSL).

The clay layer in the Patapsco forms the middle confining bed separating the upper and lower Patapsco aquifers. The vertical hydraulic conductivity, for samples collected at the ASL, ranges from $1x10^{-8}$ to $2x10^{-7}$ cm/sec.

The lower sandy layer of the Patapsco forms the lower Patapsco aquifer. This aquifer acts both as a water table (unconfined) aquifer and as a confined aquifer depending on whether the upper Patapsco aquifer is present. At the ASL, where the upper Patapsco is present, the lower Patapsco is a confined aquifer. At the DSY and IL2, where the upper Patapsco is not present, the lower Patapsco acts as a water table aquifer. Regional ground water flow in the lower Patapsco aquifer is toward the southeast, consistent with the formational dip. On site, the ground water flow direction varies. In the confined portion of the aquifer at the ASL, the lower Patapsco flows to the southeast, consistent with the regional direction. In the water table portions of the aquifer, the flow direction varies depending on site topography and surface water locations. Hydraulic conductivities range from $4x10^{-4}$ to $2x10^{-3}$ cm/sec in the confined portions and from $1x10^{-4}$ to $2x10^{-2}$ cm/sec in the unconfined portions.

The Arundel Formation acts as a confining bed between the lower Patapsco and the Patuxent aquifers. The Arundel has a low vertical permeability.

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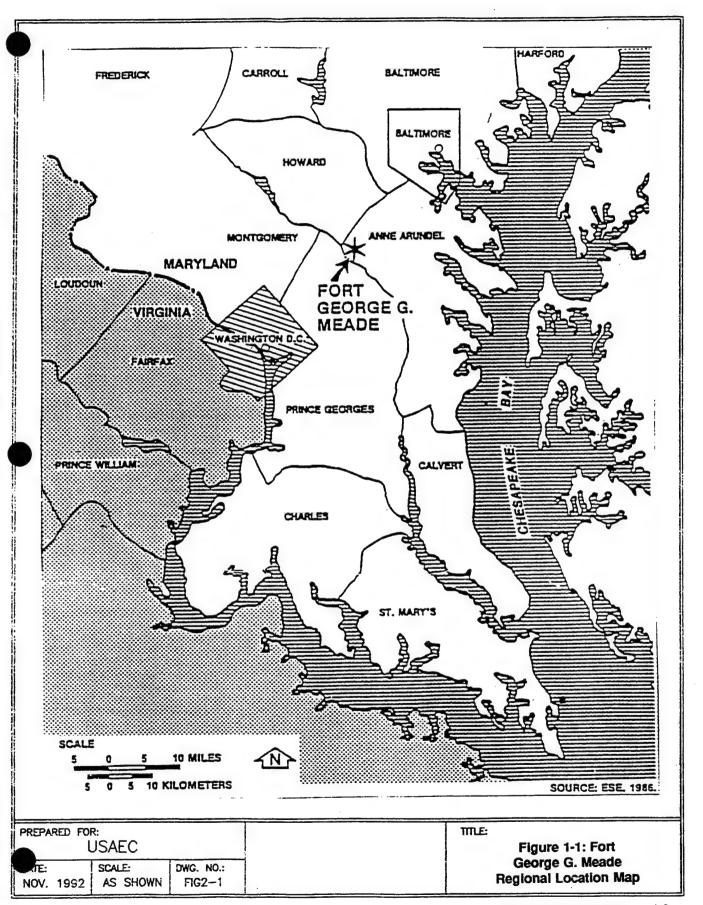
The Patuxent Formation forms the lower confined aquifer. The Patuxent aquifer has been identified as a confined aquifer for all sites at FGGM where encountered. Based on regional geology, it is likely that the Patuxent aquifer exists under water table conditions west of the base, but is unlikely to do so at FGGM. Regional ground water flow in the Patuxent is toward the southeast, consistent with the regional dip. Because few of the wells at FGGM are in the Patuxent aquifer, no ground water contour map has been constructed.

According to the Maryland Geological Survey (Mack and Achmet, 1986), the bedrock in Anne Arundel County is expected to be similar to the low hydraulic conductivity bedrock in the Piedmont region.

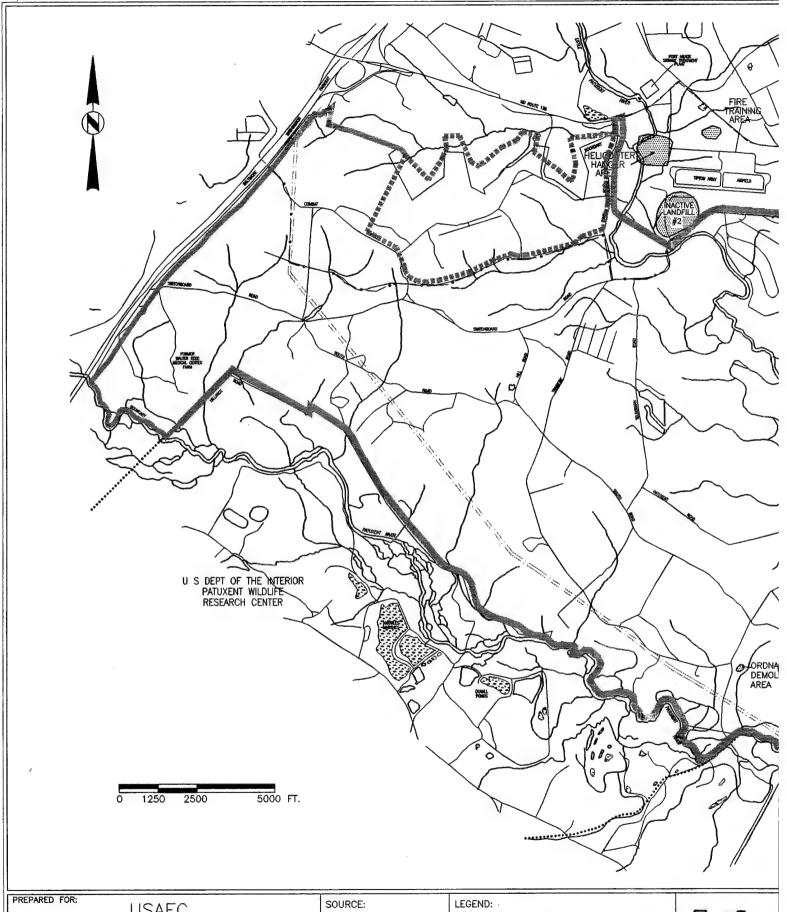
1.3 Report Organization

The format of this report is as follows:

- Section 1.0: Introduction Background and basewide information
- Section 2.0: Technical Scope of Work and Investigation Objectives and Procedures - Detailed rationale and procedures for the completed SIA data collection activities
- Section 3.0: Basewide Investigation Information related to all sites, such as appropriate regulations, quality assurance, and background soil chemistry
- Sections 4.0 through 9.0: Physical Characterization and Contaminant Assessment. Data collected during the SIA, conclusions, and recommendations for each SIA area at FGGM:
 - Section 4.0 DPDO Salvage Yard and Transformer Storage Area
 - Section 5.0 Fire Training Area
 - Section 6.0 Helicopter Hangar Area
 - Section 7.0 Inactive Landfill No. 2
 - Section 8.0 Ordnance Demolition Area
 - Section 9.0 Soldiers Lake







PREPARED FOR:

USAEC

SOURCE:
Remedial Investigation
Addendum (ADL, 1994)

DATE:
JAN. 1994

SCALE:
FMBM-E

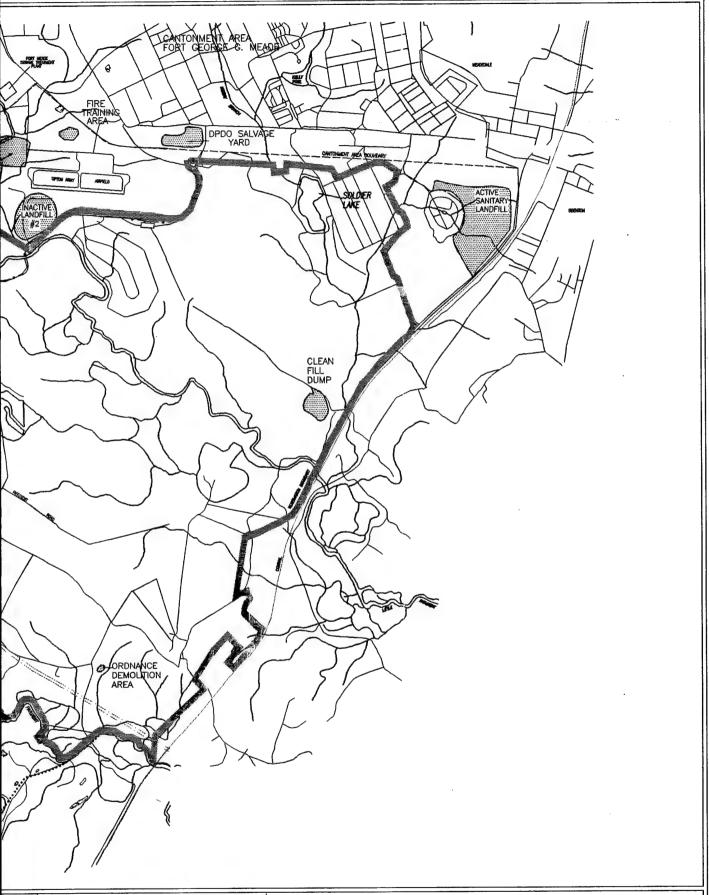
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SOURCE:
Remedial Investigation
Addendum (ADL, 1994)

7600+/- Acre Boundary
7600+/- Acre Boundary



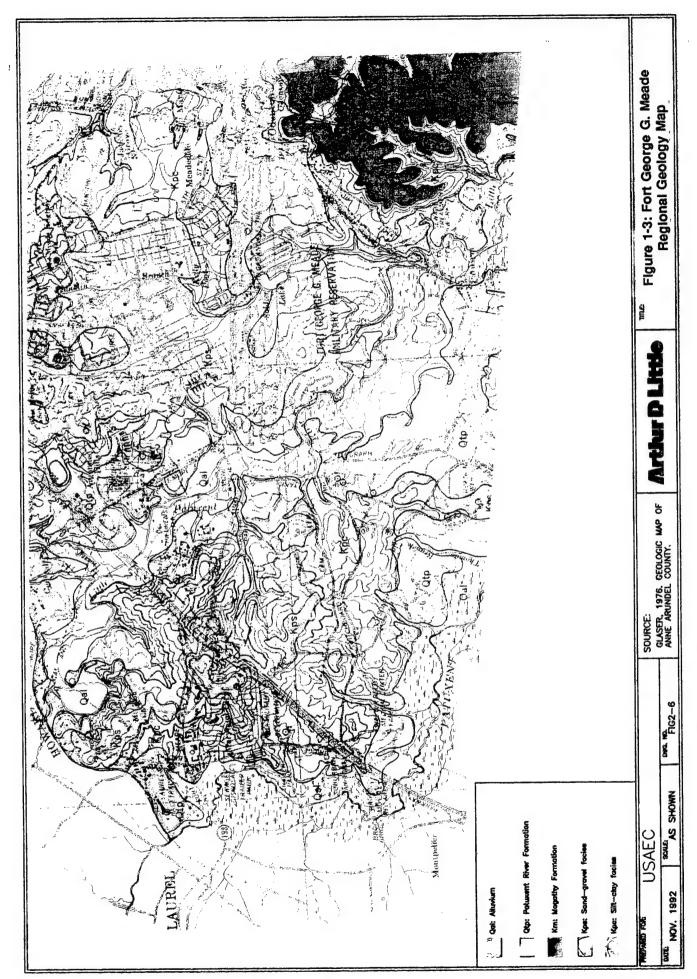


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FIGURE 1-2: LOCATION OF SITES AT FORT GEORGE G. MEADE



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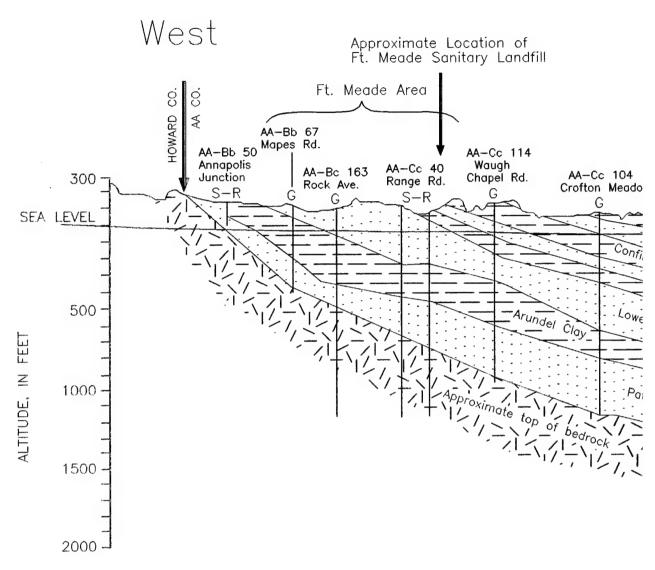
Figure 1-4: Stratigraphic Column for Anne Arundel County

System	Series	Group	Formation.	Average Thickness	Hydrologic Character	General Lithology
QUATERNARY	HOLOCENE and PLEISTOCENE		Alluvium and terrace deposits	30	Confining bed in most places. Poor aquifer in some places.	Sand, gravel, silt, and clay.
	EOCENE		Nanjemoy Formation	80	Confining Bed	Sand, with clayey layers, glauconitic.
			Mariboro Clay	30	Confining bed.	Clay, plastic, pale-red to silvery gray.
TERTIARY	PALEOCENE	PAMUNKEY	Aquia Formation	100	Aquifer	Glauconitic, greenish to brown sand with indurated or "rock" layers in middle and basal parts.
			Brightseat Formation	40	Confining bed in most places. Poor aquifer in some places.	Sand, silt, and clay, olive gray to black, glauconitic.
	UPPER		Severn Formation	90	Poor aquifer in places.	Sand, silty to fine, with some glauconite.
			Matawan Formation	30	Confining bed	Silt and fine sand, clayey, dark gray to black, glauconitic.
	CRETACEOUS		Magothy Formation	100	Aquifer	Sand, light gray to white, with inter-bedded thin layers of organic black clay.
			Upper Part	250	Confining bed	Clay, tough, variegated color.
CRETACEOUS					Aquifer	Sand, fine to medium, brown color.
	LOWER		Lower Part	250	Confining bed	Clay, tough, variegated color.
		POTOMAC			Aquifer	Sand, fine to medium, brown color.
	CRETACEOUS		Arundel Clay	250 (?)	Confining bed	Clay, red, brown, and gray, contains some ironstone nodules and plant remains.
			Patuxent Formation	250 (?)	Aquifer ? Confining Bed Aquifer ?	Sand, gray and yellow, with interbedded clay; kaolinized feldspar and lignite common. Locally clay layers predominate.
LOWER PALEOZOIC (7) to PRECAMBRIAN (7)			Basement ¹ Complex	Unknown	Confining bed	Probably gneiss, granite, gabbro, meta-gabbro, quartz diorite and granitized schist.

¹ Consolidated red shaly rocks of Triassic(?) age were drilled at Sandy Point State Park.

Source: Mack and Achmad. 1986. Evaluation of the Water-Supply Potential of Aquifers in the Potomac Group of Anne Arundel County, Maryland. Maryland Geological Survey, Report of Investigations No. 46.



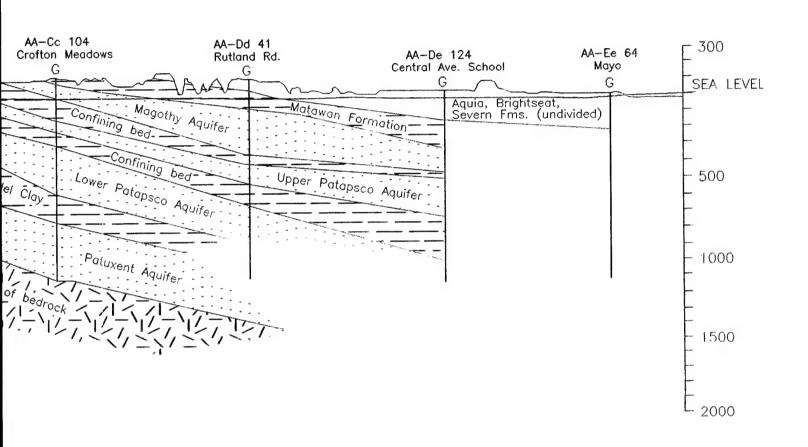


LEGEND

- G GAMNA RAY LOG
- S SPONTANEOUS POTENTIAL LOG
- R RESISTIVITY LOG



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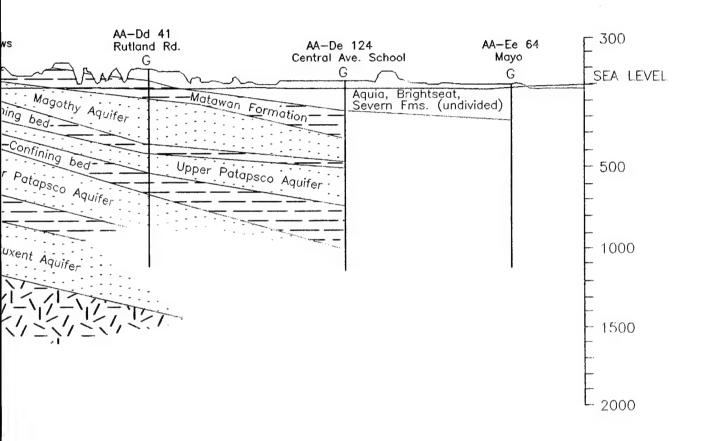


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Arthur D L	Ittle	FIGURE 1-5 HYDROGEOLOGIC CROSS-SECTION ACROSS		
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SI Addendum: FGGM Section No.: 1.0

Revision No.: 1

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Table 1-1: Location of Site Inspection Addendum Sites

Site Name	Site Abbr.	Location on Base
Inactive Landfill No. 2	IL2	South of Tipton Airfield and about 450 feet north of Little Patuxent River.
DPDO Salvage Yard and Transformer Storage Area	DSY	Immediately north of Route 32.
Helicopter Hangar Area	ННА	West of Tipton Airfield.
Fire Training Area	FTA	North of Tipton Airfield.
Ordnance Demolition Area	ODA	Southeast corner of the parcel at Range 16.
Soldiers Lake	SL	South of Route 32 and approximately one mile west of the BRAC parcels eastern boundary.

NOTES:

Abbr. - Abbreviation

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2.0 Technical Scope of Work and Investigation Objectives and Procedures

2.1 Technical Scope of Work

The purpose of the SIA field investigation was to collect sufficient data to determine if chemical releases or contamination have occurred at suspected sites, and/or to further investigate areas of potential concern.

Each of the field tasks was conducted to evaluate potential problems or to fulfill an existing data gap. Data gaps and the rationales for the field tasks are included on Table 2-1. Figure 2-1 summarizes the entire SIA technical scope of work (SOW) as it was completed. Detailed descriptions of the SOWs and any deviations from the proposed SOW for each area are included in Sections 4.0 through 8.0.

The general objectives for each type of field procedures are included in Section 2.2. Summaries of the procedural methods are included in Section 2.3.

2.2 Investigative Objectives

2.2.1 Surface Water and Sediment Investigation

A surface water and sediment sampling program was conducted to evaluate the distribution and potential impact, if any, of migrating contaminants into the surface water or sediment. Surface water samples were collected to determine if source constituents have migrated into the surface water regime. The interaction between source and surface water is important in understanding the surface water's potential as a contaminant migration pathway or potential exposure area.

Sediments can potentially act as "contaminant traps" by two means, settling of particulate matter into the sediment, and adsorption of contaminants onto the sediment particle surfaces. If the sediments become contaminated, they can become potential sources that slowly release contamination into the surface water body, even after the original source is discontinued. Additionally, sediment contamination can adversely affect benthic stream biota.

Surface water and sediment samples were collected from three areas:

- FTA: One sediment sample was collected from the oil water separator.
- HHA: Five surface water and four sediment samples were collected.
- SL: Two surface water samples were collected.

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2.2.2 Geology and Hydrogeology Investigations

The geologic investigation included two tasks: a surface soil hand augering program and an exploratory boring program. The purpose of both programs was to determine the physical and chemical characteristics of the soil. That information is necessary for:

- Determining which stratigraphic unit is present in the boring, which is then incorporated into the overall understanding of site and regional geology
- Estimating soil characteristics such as porosity and relative permeability, both of which are necessary to understand ground water movement
- Evaluating background soil chemistry for comparison to potentially affected soils
- Evaluating potential contaminant source chemistry

Three shallow soil samples were collected from each of the SIA and RIA areas for evaluation of background soil chemistry. Additionally, shallow soil samples were collected from two of the areas at FGGM to determine impacts of base activities:

- DSY: Six soil samples were collected to determine if the storage of transformers had impacted shallow soils.
- ODA: Eleven soil samples were collected from various depths at four locations to determine the effect of ordnance demolition on soil chemistry.

All nine soil borings drilled during the SIA were completed as monitoring wells. The newly installed wells were then used as part of the ground water investigation, which included ground water quality and hydraulic components. The purpose of the hydraulic investigation, which included water level measurements, was to identify the flow gradients and flow rates within the subsurface. The purpose of the ground water quality assessment was to (1) better define the contaminant plume margins, (2) define additional contaminant plumes, and (3) provide more adequate coverage in areas with insufficient data. A total of 18 wells were sampled during the SIA, including the following new wells:

- DSY: Two new wells were installed to help determine the extent of the VOC contamination.
- FTA: Three new wells were installed to evaluate potential ground water contamination in the area.
- HHA: One new well was installed to evaluate the nature of contamination in an area of high soil gas concentrations.

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 ODA: Three new wells were installed to evaluate potential ground water contamination in the area.

In addition to installing new wells, all existing wells at the DSY, IL2, and HHA were sampled to determine ground water quality, and to determine if any changes had occurred since the previous sampling round.

Rainfall in the FGGM area was slightly below average for January and February of 1993, but significantly above average in March 1993. The average March rainfall is 3.38 inches, but 8.12 inches fell in March 1993 (National Weather Service, 1994). This unusually wet period delayed some field work and may have affected sample results. For example, ground water collected from shallow monitoring wells may have lower concentrations of contaminants than normal due to dilution. Also, overland flow of contaminants has a greater affect than normal. This may have occurred at the CFD where overland flow may have caused downgradient contamination through upwelling of ground water or by contact with surface debris.

2.2.3 Elevation Surveys

The objective of the location and elevation survey was to permanently and accurately provide location and elevation control for all new sampling points. The survey data are used for accurately plotting sample locations and for determining hydraulic flow directions and gradients, all of which are necessary for developing a site-specific chemical transport and fate model.

2.3 Investigative Procedures

The quality of the data collected for the FGGM investigation is a function of the overall design and planning of the sample collection program and the specific sample collection and handling procedures used. In addition to sample collection, our activities during the field investigation involved sample identification, sample handling, and field documentation. The standard procedures used to complete these tasks are detailed in the following documents:

- Geotechnical Requirements for Drilling, Monitor Wells, Data Acquisition, and Reports (USATHAMA, 1987)
- Quality Control Program (USATHAMA, 1990)
- Quality Control Plan (QCP) for Fort Meade, Maryland (Arthur D. Little, 1993c)
- Work Plan for Fort Meade, Maryland (Arthur D. Little, 1993d)
- Standard Operating Procedures (SOPs) (Arthur D. Little)

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- Health and Safety Plan for Fort Meade, Maryland (Arthur D. Little, 1993b)
- Investigation-Derived Waste (Appendix O)

The sections below summarize the procedures, including any general deviations during the FGGM field investigation. Deviations specific to only one area are discussed in Sections 4.0 through 9.0.

2.3.1 Sample Identification, Handling, Preservation, and Shipping

2.3.1.1 Sample Identification. All samples collected during the FGGM field investigation were identified by their USAEC site identification (ID) and a unique nine-digit field ID tracking name. Existing site IDs were used when possible; new site IDs were chosen to match the existing site IDs. Site IDs identify the location at which a sample is collected.

The purpose of the field ID was to ensure that each sample had a unique name that could be used to track the sample as it progressed from the field to the laboratory and then to track the data as they were reported from the laboratory. A computerized system was used in the field that printed barcoded labels that could be scanned into the computer to produce chain-of-custody forms and to build a computerized database of samples sent to the laboratory. The field IDs were defined as follows:

Digit Number	Information	Examples
1	Location at FGGM	D=DSY, F=FTA, H=HHA, I=IL2, O=ODA, S=Soldiers Lake B=background, W=waste, Q=quality assurance
2	Sample round	Always set at 1 for this investigation
3	Sample type/source	M=monitoring well, T=stream, D=sediment, S=surface soil, B=boring, L=leachate, R=residential well, A=hand auger, X=waste/blanks
4-7	Site ID number	Based on site ID. MW-103 would have digits 0103.
8	Filtering status for aqueous samples; relative depth for soils	Y=unfiltered, Z=filtered, relative depths A-Z
9	Analysis	V=VOCs, S=SVOCs, M=metals, H=TPHC, P=PCB/pesticides, E=explosives, C=chloride, 4=sulfate, N=nitrate, T=TDS, O=TCLP organics/metals

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For example, a ground water sample from the DSY, with a site ID of MW-43D, being analyzed for total metals, would have a field ID of D1M043DYM.

2.3.1.2 Sample Handling, Preservation, and Shipping. Sample handling includes the tasks involved from the time a sample is collected until it is shipped to the laboratory. The specific tasks depend upon the type of sample being collected and the intended analysis. Consistency in sample handling ensures that samples do not become contaminated or their integrity becomes compromised.

All samples were collected in either glass or polyethylene bottles, as specified on Table 2-2. Standard sampling and sample handling procedures are described in detail in Arthur D. Little's SOPs and Quality Control Plan (QCP). Procedures specific to USAEC or FGGM are summarized below:

- Samples collected for aqueous volatiles were first subjected to a preservative test as follows:
 - Three vials were triple pre-rinsed.
 - One vial was filled with the sample water, and a known volume (approximately 10 drops) of hydrochloric acid (HCl) was added.
 - The vial was closed and shaken and the final pH was tested.
 - If the pH was less than or equal to 1, the same volume of acid was added to the two remaining pre-rinsed vials and the sample was collected in the pre-preserved vials.
- Soil samples for volatile analysis were collected and then immediately transferred to vials. During drilling, the VOC sample was placed into the vial immediately after peeling the split-spoon sample and prior to descriptive logging. When composite hand auger samples were being collected, the VOC vials were filled from the first auger as soon as it was brought to the surface. The remaining soil sample containers were filled after the sample was composited in a stainless steel bowl using a stainless steel spoon.
- After a sample was collected, it was placed on ice and, at the end of the day, taken to the field trailer. Samples that required chemical preservation (Table 2-2) were then preserved and the final pH tested and documented. Samples for dissolved metals were filtered using a peristaltic pump with an in-line high-capacity 0.45 micron filter.

All samples were shipped on ice to DataChem Laboratories in Salt Lake City, Utah.

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Chain-of-custody forms were placed in plastic bags and taped to the inside of the cooler lid. The coolers were taped and custody-sealed shut, and then shipped via Federal Express for overnight delivery.

2.3.2 Field Documentation

Field documentation is an essential part of the field investigation because it ensures that all of the necessary information is collected, any deviations from the standard operating procedures and the QCP are reported, and all field events can be recreated if necessary (SOP ADL-4014). Numerous forms were used in the field to document our work:

- A field notebook accompanied each sampling team throughout the day. All relevant site information not included on more specific forms was recorded in the notebooks.
- Calibration of field equipment was documented in the calibration notebook kept with the recharging equipment. Entries included date, initials of person calibrating, and any problems encountered.
- Drilling Logs, Well Installation Diagrams, and Daily Drilling Logs were used for all drilling activities.
- Well Development Logs were used for development of new monitoring wells.
- Well Sampling and Surface Water and Sediment Sampling Logs were used as appropriate.
- Daily Health and Safety reports were filled out daily by each team.
- Chain-of-Custody forms were completed for each sample shipment.
- Weekly field reports summarized the week's activities and were accompanied by the health and safety report, the necessary field forms and copies of the appropriate pages of the field notebooks. These reports were forwarded to USAEC when completed.

2.3.3 Surface Water and Sediment Sampling Procedures

Surface water sampling procedures depend upon the depth of the water to be sampled (SOP USA-1001). In shallow water (less than one foot deep), samples can be collected by immersing the sample bottles in the water taking care not to disturb the sediment.

In deeper waters, the samples can be collected by either wading into the water body or by use of a discrete bomb sampler. If the water body is deeper than twenty feet, a

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vertical temperature profile of the water column should be measured to determine if a thermocline exists. In any case, field parameters should be measured prior to sample collection, and samples should be collected starting from downstream and moving upstream.

Procedures and deviations specific to FGGM were:

- All surface water samples were collected from shallow water less than three feet deep.
- Samples for VOCs were not collected by immersion. VOC samples were first
 collected in a prerinsed (non-VOC) sample bottle and then gently poured into the
 VOC vial. Although this may cause slight volatilation of contaminants, it was
 necessary because the vials were pre-preserved with HC1.
- Field screening readings (temperature, pH, conductivity, and turbidity) were collected following sample collection. This was done to ensure that the measurement could be collected in-situ without causing sediment problems in the shallow water.
- One of the samples from Soldiers Lake required ice augering, using a hand powered auger for access. Both of the Soldiers Lake surface water samples were collected as grab samples because the depth sampler would freeze during sample retrieval.

Sediment samples were collected from shallow stream bottoms either with a stainless steel trowel or a stainless steel hand auger. Samples for VOCs were collected immediately, and then the remaining sediment was placed in a stainless steel bowl, composited with a stainless steel spoon, and transferred into the appropriate sample containers. Sediment composite samples were collected by mixing equal volumes of soil from multiple locations. Generally, three volumes were collected using a hand auger in a triangle-shaped pattern. In locations where only small volumes could be obtained with the hand auger, up to six separate sample aliquots were collected for mixing. The sample aliquots were mixed with a stainless-steel spoon in a stainless-steel bowl until they were visually homogeneous to form a composite sample.

Sketch maps of the location were included in either the field notebook or in the sample collection logs. The depth of the water above the sediment was measured and noted.

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2.3.4 Geologic Investigation Procedures

2.3.4.1 Shallow Soil Sampling. Two types of shallow soil samples were collected during the SIA: surface soils from 0 to 6 inches and shallow soils from 2 to 3 feet. Surface soils were collected to determine if stained areas had affected soil quality. The shallow samples were collected below the soil surface so that they were representative of the surficial deposits.

Three shallow soil samples were collected from each area at FGGM to establish background concentrations for metals and pesticides. Care was taken to collect background samples from undisturbed areas to obtain representative information about the area. Sampling locations were selected in areas with no visibly disturbed soil or with no indication of former human activity. However, only two samples were collected and analyzed from the FTA due to a sheen in the water at one sampling location.

At the FTA, only two background samples were collected and analyzed. A third representative background sample could not be analyzed because the water table in the area where the sample was collected was just below the surface (1 inch) and had a sheen. There were no other undisturbed areas nearby to serve as a substitute background sampling location and it was not clear whether the observed sheen was due to decaying organics or contaminant migration. Thus the sample was discarded.

The shallow soil samples were collected with a stainless steel hand auger. During the augering, changes in the soil with depth were noted and the sample was not collected until the natural soils were reached. Natural soils are soils that do not contain any fill or organic material such as cement, tree bark, plastic, etc. To ensure consistency, most samples were collected from 2 to 3 feet. Following collection, the soil type was described, and the sample was composited in a stainless steel bowl and transferred to appropriate containers.

Six surface soil (0 to 6 inches) samples were collected from the DSY transformer storage area. These samples were collected in a grid pattern, primarily from stained areas. The samples were collected in the same manner as the background soil samples.

2.3.4.2 Exploratory Boring Procedures. The soil boring program was conducted from January 19 to February 10, 1993. All drilling was conducted by the drilling subcontractor, ATEC Associates Inc. (ATEC), of Columbia, Maryland.

Unexploded ordnance (UXO) surveys were conducted in conjunction with the soil boring program by Environmental Hazards Specialists International, Inc. (EHSI) of Belvidere, North Carolina. UXO screening was conducted prior to and during any invasive procedure (i.e., drilling). The initial UXO survey was to a depth of 5 feet.

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During the field investigations, downhole UXO monitoring was conducted at 4-foot intervals to a depth of 20 feet. To conduct the downhole UXO surveys, all drilling operations were discontinued, the augers were removed from the borehole and all metal objects including the drill rig were moved at least 15 feet from the boring. Downhole UXO monitoring was discontinued at depths of 20 feet; EHSI personnel were present at each location until well installation or well abandonment was completed.

The only drilling method used during the SIA soil boring activity was hollow stem auger (SOP USA-4001). Hollow stem auger (HSA) was used because it does not require the introduction of water during drilling, thus minimizing the impact upon local hydrogeology and changes to the hydraulic conductivity of the penetrated stratigraphic units. HSA involves advancing the augers into the subsurface using hydraulic pressures and rotation. Both the rotation of the augers during advancement and the screw-like orientation of the auger flights result in sediments being removed from the path of the auger and transported to the ground surface.

The final drilling depth for each borehole varied depending on the depth at which the ground water was encountered. All boring/well abandonments required prior approval by the USAEC geologist or Contracting Officer's Representative, regardless of reason. There were no borehole abandonments due to UXO. Specific deviations from the Geotechnical Requirements and the Work Plan are detailed for each area in Sections 4.0 through 8.0.

The breathing zone and boring headspace were continuously monitored during the soil boring program using either an Industrial Scientific MX 251 or AIMS 3000 combustible gas meter to monitor percent oxygen and lower explosivity limit and a Photovac photoionization detector (PID) to monitor total VOCs. Drill spoils were also screened with a geiger counter to screen for radioactivity.

Soil samples were collected with a 2-inch diameter, 24-inch long split spoon. The split spoon was advanced ahead of the auger in order to collect an undisturbed sample. Blow counts were recorded for each 6-inch interval and the spoon was immediately retrieved from the borehole. Upon removing and opening the split spoon, VOCs were measured with a PID. The split spoon samples were described and logged for later comparison and analysis. The Munsell color chart was used as a standard for color analysis. The Unified Soil Classification System (USCS) was used to classify unconsolidated sediments by grain size, particle type, and sorting. The ASTM Standard Penetration Test (SPT) was used to record relative compaction of overburden materials. The test measures split spoon penetration resistance by recording the number of blows required to drive the split spoon 6 inches, using a 140-pound hammer dropped 30 inches. Moisture content was estimated and total

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VOC concentration was measured using a PID. All data were recorded on permanent field forms.

If chemical samples were collected, the split spoons were opened, material located along the outermost portion of the spoon (skin) was removed, and the soil samples were collected. VOC samples were collected first directly from the spoon to minimize the amount of volatilization of contaminants, then the remaining soils were composited in a stainless steel bowl and distributed among the appropriate bottles. Sampling depths for each analyte were noted in the field logs.

2.3.5 Ground Water Investigation Procedures

2.3.5.1 Monitoring Well Installation and Development. The USATHAMA (1987) Geotechnical Requirements for monitoring well installation specify a maximum of 3 feet of sand filter pack beneath the well screen, a minimum of 5 feet of filter pack above the well screen, a minimum bentonite seal of 5 feet, then grout to surface (SOP USA-4003 and USA-4008). These requirements assume ground water depths of 13 feet or more. The ground water in many locations at FGGM was shallow, thus the recommended requirements were not applicable. Approved deviations for specific sites are discussed in Sections 4.0 through 9.0.

All materials used for the monitoring well construction were approved by the USAEC geologist prior to initiating any field operations. The specifications for all of the materials used were maintained in the field trailer. The monitoring wells were constructed with a 4-inch, schedule 40 PVC riser and 10 feet of 0.010-inch slotted PVC screen. Well screens were packed with silica quartz sand and sealed with bentonite chips. A cement bentonite grout was tremied into the annular space in all wells above the seal. At the surface of each well, a 5-foot orange painted protective steel casing (2.5 foot stick-up) with padlocked steel caps was cemented into the ground with a square, 4-foot by 4-foot by 0.5-foot pad. Four orange-painted pickets were positioned 4 feet away from the casing to protect the monitoring well. All of the materials used to construct the monitoring wells (e.g., casing, riser, screen) were steam cleaned before installation as specified in the Geotechnical Requirements (USATHAMA, 1987).

Identically keyed brass locks were used to secure all wells. The PVC riser of each well was double notched or marked to provide a datum for elevation survey and water level measurements. Well names were painted with white paint on the steel casing.

All new monitoring wells were developed according to the USATHAMA Geotechnical Requirements (USATHAMA, 1987) and the Work Plan (Arthur D. Little, 1993d). Five times the standing water volume in the well (casing plus annulus) was removed for development. If any water was introduced during the drilling

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operations, five times that volume was also removed. Field parameters temperature, pH, conductivity, and turbidity were measured prior to beginning development, once during the process, and at the end of development.

Deviations from the Work Plan (Arthur D. Little, 1993d) and Geotechnical Requirements (USATHAMA, 1987) are discussed under each site, however several basewide deviations were approved:

- The time period for development of new wells (48 hours to 7 days) was extended due to circumstances beyond control, such as access problems.
- Due to the large volume of purge water, the historical data, and the shallow depth to ground water, USAEC approved discharging all purge water directly onto the ground.

2.3.5.2 Monitoring Well Sampling. The monitoring wells were sampled beginning in February 1993 and ending in April 1993 with some additional sampling during January 1994. Collection of ground water samples included multiple tasks: water level measurements, purging, field parameter screening, and sample collection.

Prior to initiating sampling at each area, a complete set of depth-to-water and total depth measurements was collected. The measurements were collected before sampling to ensure that well purging did not affect the ground water flow direction or gradients.

Purging consists of removing a volume of water from the well equal to five times the standing water. Evacuation of five well volumes of standing water was used as set forth in the U.S. Army Toxic and Hazardous Materials Agency document Geotechnical Requirements for Drilling, Monitor Wells, Data Acquisition, and Reports (March, 1987). Water quality parameters including pH, conductivity, temperature, and turbidity were measured before and during purging, before sampling, and immediately after sampling for each location. The field parameters collected represent the range of least-sensitive indicators of aquifer re-equilibration to most-sensitive indicators of equilibrated conditions. The data collected during these investigations were used to confirm ground water flow patterns and characterize ground water quality.

Submersible pumps and bailers were used for a number of reasons for sampling at FGGM. Among the reasons were lack of acceptable alternative sampling methods, variable well conditions, cost, and data comparability to previous sampling events at FGGM. A low-flow purging technique was not considered for sampling events at FGGM for the SIA or RIA work because it was not a widely accepted industry standard at the time of work plan development. For example, the draft final EPA

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Region I Groundwater Sampling Procedure for Low Flow Purge and Sampling was published August 10, 1994.

Submersible pumps and bailers were used to reduce variability and level of effort in sampling from well to well. Some wells at FGGM have a depth to water that is greater than 26 feet bgs, limiting the use of peristaltic pumps; some wells have high LEL readings, which may limit the use of electric pumps. Therefore, a bladder pump, with additional equipment, and an EPA-recommended seven-step decontamination procedure would have been necessary. Consistency in sampling procedure was maintained with the use of bailers and submersible pumps.

Ground water samples were collected previously at FGGM with bailers and submersible pumps. Comparability between data sets would have been questionable with a change in sampling technique.

Deviations from the Work Plan (Arthur D. Little, 1993d) and Geotechnical Requirements (USATHAMA, 1987) are discussed under each site, however, several basewide deviations were approved by USAEC:

- New wells could be sampled 7 days after development rather than the 14 days required in the Geotechnical Requirements (USATHAMA, 1987).
- If a well purged dry, the following procedure was followed:
 - Allow the well to recharge to its original level or for a minimum of 4 hours.
 - Purge dry a second time.
 - Allow the well to recharge a second time to either its original level or for a minimum of 4 hours.
 - Collect the samples.

In some cases, wells that purged dry were allowed to recharge overnight and then repurged or sampled the following morning.

Appendices A through F include all of the field forms for the parcels investigated during the SIA: boring logs, monitoring well installation logs, well development logs, and monitoring well sampling forms.

Appendices G through N include copies of the analytical results from the individual sampling events during the SIA.

2.3.5.3 Elevation Survey Procedures. The location and elevation of each of the 14 newly installed wells were surveyed by Greenhorne and O'Mara of Greenbelt, Maryland. The survey point of each well was located between the double notches previously installed on the rim of the well riser. For horizontal control, the positions were surveyed using Universal Transverse Mercator. The vertical elevations were surveyed using the National Geodetic Vertical datum of 1929.

Figure 2-1: Summary of Activities

	Inves	tigative	investigative Activities	sej								
Site Name	Site Inspection	notisgitsevni lsibemeA	Records Search	UXO Survey	Supply Well Survey	Soil Boring Samples	Seldmed framibed	Surface soil Samples	Soil Borings	alleW gninotinoM	Ground Water Samples	Sludge Samples
Si Addendum												
Inactive Landfill No. 2	•										9	
DPDO Salvage Yard	•			•						2	80	
Transformer Storage Area	•			•				9				
Helicopter Hangar Area	•						2/2			1	9	
Fire Training Area	•			•						3	က	-
Ordnance Demolition Area	•			•		12			4	3	3	
Background	•							30				
Soldiers Lake	•						2/0					
Drilling Water											2	
Totals						12	2//5	36	4	6	28	1
						l				ľ		ĺ

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Arthur D Little

No changes occurred.

direction of ground water flow and contaminant

Information will be used to determine likely

contamination; evaluate potential contamination caused by the 10,000-gallon tank.

analyze for TCL VOCs, petroleum hydrocarbons.

Collect one soil sample for the boring and

characterized in areas of high soil gas or

near the 10,000-gallon tank.

existing wells and analyze for TCL VOCs, TCL

Collect ground water samples from new and

SVOCs, petroleum hydrocarbons, TAL metals

(total, dissolved).

Have new and existing wells surveyed for

Ground water flow direction is

unknown.

2-14

location and elevation; collect water level

indicative an additional areas of ground water

Table 2-1: Rationale for the Scope of Work, SIA, Fort George G. Meade

Data Gap	Data Acquisition Activity	Rationale	Changes in SOW
8. The potential exists for soil contamination at the oil/water separator but no data exists	Collect a total of eight soil samples from four locations (two depths/hole).	Determine if this area could be a source for potential ground water or outfall contamination.	No samples were collected because the base of the separator was too deep for board angeston and also become
	Analyze four samples for TCL VOCs, TCL SVOCs, petroleum hydrocarbons and TAL metals.		itatis augeting, and any occasion frozen ground and site operations limited access.
Fire Training Area 9. Confirm ground water contamination.	Install three wells and collect three ground water samples.	Odors observed during the SI (1992) indicate ground water contamination in this area.	No changes occurred.
	Perform chemical analyses: TCL VOCs, TCL SVOCs, petroleum hydrocarbons, TAL metals (total, dissolved).		
 There are currently no data regarding the suspected oil/water separator. 	Collect a sludge sample from the oil/water separator.	The oil-water separator may be acting as a continuous source to ground water	No changes occurred.
	Perform chemical analysis: TCL VOCs including from, TCL SVOCs, TAL metals and petroleum hydrocarbons.	contamination.	
Ordnance Demolition Area 11. Extent of soil contamination is not well defined.	Collect three soil samples each from four soil borings for a total of twelve soil samples.	One of the soil samples collected during the SI contained detectable RDX. Open demolition of	No changes occurred.
	Perform chemical analyses: Explosives, TAL metals.	explosives may have caused contamination by explosives.	
 No data are available on ground water quality. 	Complete three of the borings as monitoring wells. Collect three ground water samples.	Ordnance demolition, plus ponding of rain water, may have caused ground water contamination	No changes occurred.
	Perform chemical analyses: TCL VOCs, TCL SVOCs, TAL metals (total, dissolved), explosives.	The three wells are necessary for determining ground water flow directions and contaminant plume extents.	
13. Contaminated ground water may be discharging to the surface at a spring	Collect one surface water and one sediment sample from the spring.	The data will indicate if contaminated ground water is discharging upward.	No sample was collected because the seep was not observed.
located in the southeast comer of the ODA.	Perform chemical analysis: TCL VOCs,		

TAL = Target Analyte List
TCL = Target Compound List
SVOC = Semivolatile Organic Compound
PCB = Polychlorinated Biphenyl
VOC = Volatile Organic Compound
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine

explosives.

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Table 2-2: Containers, Preservation, and Holding Times for Analytical Samples

Analysis	Sample Containers Preservation		Holding Times
TCL Volatiles - water	Two 40-mL amber glass VOA vials, Teflon-lined cap	HCl to pH<2 Cool, 4°C	14 days
TCL Volatiles - soil/sediment	250-mL amber wide-mouth glass jar, Teflon-lined cap	Cool, 4°C	14 days
TCL Semivolatiles - water	1-L amber glass jar, Teflon-lined cap	Cool, 4°C	7 days to extraction; 40 days after extraction
TCL Semivolatiles - soil/sediment	250-mL amber wide-mouth glass jar, Teflon-lined cap	Cool, 4°C	7 days to extraction; 40 days after extraction
PCBs - water	1-L amber glass bottle, Teflon-lined cap	Cool, 4°C	7 days to extraction; 40 days after extraction
PCBs - soil/sediment	250-mL amber wide-mouth glass jar, Teflon-lined cap	Cool, 4°C	7 days to extraction; 40 days after extraction
Explosives - soil/sediment	250-mL amber Cool, 4°C wide-mouth glass jar, Teflon-lined cap		7 days to extraction; 40 days after extraction*
Explosives - water	1-L amber glass bottle, Cool, 4°C Teflon-lined cap		7 days to extraction; 40 days after extraction
TAL metals (ICP/GFAA) - water	1-L Polyethylene bottle, HNO ₃ to pH<2 Teflon-lined cap		6 months
TAL metals (ICP/GFAA) -soil/sediment	250-mL amber wide-mouth glass jar, Teflon-lined cap	Cool, 4°C	6 months
Mercury - water	1-L polyethylene bottle, Teflon-lined cap	HNO ₃ to pH<2	28 days

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Table 2-2: Containers, Preservation, and Holding Times for Analytical Samples (continued)

Analysis	Sample Containers	Preservation	Holding Times
Mercury - soil/sediment	250-mL amber wide-mouth glass jar, Teflon-lined cap	Cool, 4°C	28 days
Chloride/Sulfate - water	250-mL polyethylene bottle	Cool, 4°C	28 days
Chloride/Sulfate - soil/sediment	250-mL amber wide-mouth glass jar	Cool, 4°C	28 days
Nitrate plus Nitrite - water	250-mL polyethylene bottle	Cool, 4°C H ₂ S04 to pH<2	28 days
Nitrate plus Nitrite - soil/sediment	250-mL amber wide-mouth glass jar	Cool, 4°C	28 days
Total Dissolved Solids (TDS) - water	250-mL polyethylene bottle	Cool, 4°C	7 days
Total Petroleum Hydrocarbons (TPHC) - water	1-L amber glass bottle, Cool, 4°C H ₂ SO4 to pH<2		7 days to extraction; 40 days after extraction
Total Petroleum Hydrocarbons (TPHC) - soil/sediment	250-mL amber Cool, 4°C wide-mouth glass jar, Teflon-lined cap		28 days
TCLP Analytes -water	Two 40-mL VOA vials and Two 1-L amber glass bottles, Teflon-lined cap		**
TCLP Analytes -soil/sediment	Two 250-mL amber Cool, 4°C wide-mouth glass jars, Teflon-lined cap		**

^{*} The holding times for the Explosives analysis were specified by USAEC.

^{**} The analytical holding times for the TCLP samples are provided below.

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Table 2-2: Containers, Preservation, and Holding Times for Analytical Samples (continued)

TCLP Analysis	Max. Time: Sampling to TCLP Extraction	Max. Time: TCLP Extraction to Sample Prep.	Max. Time: Sample Prep. to Analysis	Max. Total Elapsed Time from Sample Collection
Volatiles	14 days	-	14 days	28 days
Semivolatiles/ Pesticides/PCBs	7 days	7 days	40 days	54 days
Metals	180 days	-	180 days	360 days
Mercury	28 days	-	28 days	56 days

Source: USAEC Quality Assurance Program (January 1990). TCLP information was taken from 40

CFR 261.

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3.0 Basewide Investigation

3.1 Regulatory Standards and Guidelines

Federal and state regulatory standards were reviewed for relevance to FGGM. The purpose of this regulatory review is to provide the standards used for data comparison to determine if the detected concentrations were elevated. This is not intended to act as a full list of ARARs; they will be provided in the Feasibility Study. Federal standards, such as the PCB Spill Cleanup Policy, maximum contaminant levels, and Ambient Water Quality Criteria, are summarized for comparison against site data. Relevant State of Maryland regulations include Water Pollution and Water Supply. Each is summarized below.

3.1.1 Federal Regulations and Guidelines

PCB Spill Cleanup Policy. Under the Toxic Substances Control Act (TSCA), EPA has the authority to regulate PCBs use, production, and storage. An action limit of 50 ppm (µg/g) in soil has been established by EPA (40 CFR 761.125) as a baseline value to determine whether a cleanup action must be initiated. Measured concentrations of 50 µg/g or greater require EPA notification and initiation of a cleanup action. The state of Maryland has not established its own criteria for PCB management and follows the federal guidelines.

Maximum Contaminant Levels. MCLs are established in the Safe Drinking Water Act (40 CFR Parts 141, 142, and 143, 1992) and are added to, or updated, on an annual basis. Drinking water regulations from May 1993 are used throughout this document.

MCLs define the maximum permissible level of a contaminant in water that is delivered to any user of a public water supply. MCLs are given with their appropriate regulatory status: final, draft, listed for regulation, proposed, or tentative. As of May 1993, MCLs (of various status) have been defined for 67 organic compounds, 16 inorganics, and 6 radionuclides.

Maximum Contaminant Level Goals (MCLGs) are non-enforceable concentrations of drinking water contaminants that are protective of adverse human health effects and allow an adequate margin of safety.

Secondary MCLs (SMCLs) are non-enforceable and establish limits for contaminants in drinking water that may affect the aesthetic qualities and the public's acceptance of drinking water (e.g., taste and odor).

MCLs, MCLGs, and SMCLs are used for comparison with ground water concentrations to determine if elevated concentrations of the chemicals are present. This does not assume that all ground water is being used for drinking water but

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provides a regulatory basis for determining which concentrations are considered "elevated." MCLs, MCLGs, and SMCLs are summarized on Table 3-1 for the compounds and chemicals detected during the field investigation. Additionally, regulatory standards are included on the tables of detected analytes included in each section.

Ambient Water Quality Criteria. EPA is required by the Clean Water Act [33 U.S.C. 1314(a)(1)] to publish and update Ambient Water Quality Criteria (AWQC) (EPA, 1992). AWQC reflect the current scientific knowledge on:

- The identifiable effects of pollutants in a body of water on health and welfare, including plankton, fish, shellfish, wildlife, plant life, shorelines, beaches, aesthetics, and recreation
- The concentration and dispersal of pollutants through biological, physical, and chemical processes
- The effects of pollutants on biological community diversity, productivity, and stability (EPA, May 1987)

AWQC are not federally enforceable rules but are provided as guidance on the environmental effects of pollutants that may impact water quality. However, AWQC are enforceable in Maryland because they have been promulgated by the state. AWQC for seven metals (cadmium, chromium, copper, lead, nickel, silver, and zinc) are dependent upon water hardness.

For FGGM, Freshwater AWQC are used for comparison for surface water bodies. Both maximum and continuous concentration criteria are used for comparison. The most current AWQC (EPA, 1992) are summarized on Table 3-1.

The National Oceanographic and Atmospheric Administration (NOAA) has Sediment Guidelines to evaluate when sediment concentrations affect surface water quality (Long and Morgan, 1991). The guidelines are protective of both freshwater and marine benthic organisms. NOAA guidelines that have been developed include values referred to as an effects range-low (ER-L) and an effects range-median (ERM-M). The ER-L is the concentration at which 10 percent of the bioassay test species exhibited an effect, while the ER-M is the concentration at which 50 percent of the test organisms exhibited an effect. These values have been developed for selected metals, SVOCs, and pesticides and are summarized on Table 3-1.

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3.1.2 State of Maryland Regulations

Surface Water. The Code of Maryland Regulations (COMAR) 26.08.02 for Water Quality (July 1, 1991) (Maryland Department of Environment, 1991) defines water quality protection and designated classes for both surface water and ground water in the state of Maryland.

Surface water bodies are divided into four use classifications with three subclasses:

- Use I. Water Contact Recreation, and Protection of Aquatic Life. Subclass I-P includes Public Water Supply.
- Use II. Shellfish Harvesting Waters.
- Use III. Natural Trout Waters. Subclass III-P includes Public Water Supply.
- Use IV. Recreational Trout Waters. Subclass IV-P includes Public Water Supply.

According to the state of Maryland, the Little Patuxent River flowing through FGGM is classified as use I-P. Use I-P waters are subject to numerical criteria for bacteria, temperature, turbidity, and toxic substances.

Toxic substance criteria have been established for 11 metals and nine organic compounds. The state criteria are set at the same concentrations as the federal AWQC but are established for fewer analytes.

The Water Quality Regulations include an Anti-Degradation Policy for waters of the state. If water is of a higher quality than the water quality standards, that water quality should be maintained. Exceptions to the policy are if (1) there is a justifiable economic or social development, or (2) the changes will not diminish water use.

Ground Water. Ground water quality standards are also included in the Water Quality Regulations and include discharge permit requirements, aquifer type classifications, and water quality certifications for marsh creations projects, construction of bulkheads, and placement of riprap for shore protection.

The primary relevance of the ground water quality standards to FGGM is the aquifer types, which are defined as follows.

Type I. Aquifers with a transmissivity greater than 1,000 gallons/day/foot, a
permeability greater than 100 gallons/day/square foot, and total dissolved solids of
less than 500 mg/L.

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Type II. Aquifers with a transmissivity greater than 10,000 gallons/day/foot, a
permeability greater than 100 gallons/day/square foot, and total dissolved solids
between 500 and 6,000 mg/L.

or

Aquifers with transmissivity between 1,000 and 10,000 gallons/day/foot, a permeability greater than 100 gallons/day/square foot, and total dissolved solids between 500 and 1,500 mg/L.

· Type III. All aquifers other than Type I and Type II.

All three aquifers investigated at FGGM -- the Upper Patapsco, the Lower Patapsco and the Patuxent -- are Type I aquifers.

Type I aquifers may not exceed primary or secondary standards for drinking water as outlined in COMAR 26.04.01.

Type II aquifers may not exceed primary or secondary standards for drinking water upon treatment by commercially available home water treatment or softening systems. Total dissolved solids (TDS) may exceed the requirements as outlined above for Type II aquifers.

To maintain a designation of Type III aquifer, the characteristics or constituents of the water must not meet Type I or Type II criteria. There are no specific requirements for Type III aquifers. However, during the project the aquifers should be closely monitored to identify any change in transmissivity, permeability and total dissolved solids that would change their aquifer classification.

Guidelines for discharge to ground water have been established. If activities on the project site will result in discharges to ground water then the guidelines outlined in COMAR 26.08.02.09-D will be applicable.

The guidelines require that:

- The Maryland Department of the Environment's "Guidelines for Land Treatment of Municipal Wastewaters" MDE-WMA-001-11/87 be followed for land disposal of municipal or similar wastes.
- Discharges to an aquifer (Type I, II, or III) do not result in an aquifer being
 polluted to a lower quality criteria or degradation of ground waters below criteria
 established above for Types I, II, and III, except for mixing zones that are
 permitted by the Department of the Environment.

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 The Department of the Environment may require that dischargers or potential dischargers to ground water monitor ground or surface waters or both. The location and frequency would be designated by the Department of the Environment. Copies of the monitoring would be required to be submitted to the Department of the Environment.

Water Supply, Sewage Disposal and Solid Waste. Maryland COMAR Title 26.04.04 is the Well Construction Chapter of the Regulation of Water Supply, Sewage Disposal and Solid Waste. These regulations include well installation permits and well construction requirements in the state of Maryland.

Well permits were obtained by the drilling subcontractor (ATEC) from the Anne Arundel County Health Office. Applications for Permit to Drill Well and Well Completion Reports are included in Appendix G. The permit numbers, as required by Maryland, were permanently affixed to the well casings:

FGGM Area	USAEC Site ID Code	County Permit #
DSY	MW-200 MW-201	AA-88-9138 AA-88-9139
FTA	FTAMW-1 FTAMW-2 FTAMW-3	AA-88-9132 AA-88-9133 AA-88-9134
ННА	HHAMW-6	AA-88-9147
ODA	ODAMW-1 ODAMW-2 ODAMW-3	AA-88-9135 AA-88-9136 AA-88-9137

3.2 General Chemical Data Validation and Quality Assessment

3.2.1 Introduction

In order to ensure that the environmental samples collected in support of the FGGM SIA represent the actual conditions in the environment, the sampling program was designed to reduce analyte degradation, sampling variability, and cross-contamination.

Precautions were taken to prevent alteration of sample constituents, beginning with the appropriate use of USAEC and EPA approved sample containers. Such precautions were necessary to prevent changes that can occur in some samples due to biodegradation from microorganisms, the loss of volatile compounds with increasing temperature, or the loss of trace metals from solution by adsorption on sample

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container walls. Samples were iced, refrigerated, and treated with chemical preservatives (HCl, HNO₃, and H₂SO₄) to decrease volatility of organic compounds, control biological and chemical changes, and maintain trace metals in solution.

To reduce sampling variability we used standardized procedures specified in the Quality Control Work Plan (Arthur D. Little, 1993c), Work Plan (Arthur D. Little, 1993d), and SOPs. These precautions helped us ensure that sampling was performed within the same guidelines each time. Sampling variability is measured by taking duplicate samples of the various types of environmental media. The precision of Arthur D. Little's sample collection and laboratory reproducibility is demonstrated when the analysis results for the duplicate samples are within acceptable limits.

Control samples were introduced into the train of environmental samples to function as monitors on the performance of the analytical method. The laboratory analyzed quality control samples to provide quantitative evidence that the USAEC methods were performing comparable to or improved over the level demonstrated during certification. As part of the USAEC QA Program compliance requirements, it is essential that controls were initiated during and maintained throughout the analysis of samples. Two types of laboratory control samples were included in all analytical lots: method blanks, to verify that the laboratory is not a source of samples contamination; and spikes, to verify performance at the level demonstrated during certification and to distinguish between the response obtained from the blank.

The quality of the sampling collection process is also evaluated by means of trip, field, and rinsate blanks. These sample blanks provide data monitoring the sampling process for cross-contamination. The blanks are transported along with the empty sample containers being taken by the sampling team into the field. When sampling is complete, the blanks are submitted along with the field samples for laboratory analyses.

3.2.2 Types of Quality Control Samples

Quality Control (QC) samples were collected in the field to assess overall precision, accuracy, and representativeness of the sampling an analytical efforts. The number of QC samples collected for this effort was based on the total amount of field samples as established in the Quality Control Plan (QCP). The different types of QC samples and the information provided by each are briefly described below.

Trip blanks were prepared in the laboratory by filling sample containers with de-ionized water and preserving with HCl. The containers were then sealed and transported to the sampling location along with the empty sample containers. These trip blanks were sent with sample shipments during this investigation, and analyzed for VOCs to assess potential contamination during transport.

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Field blanks were used to obtain information about contaminants that may be introduced during sample collection, storage, and transport. These blanks are exposed to field conditions by preparing them at the sample collection site.

Rinsate blanks consisted of a composite from the de-ionized or distilled water used as a final rinse for cleaned sampling equipment (bailer, pump, auger, etc.) before it is reused for collecting samples. Results from analyzing rinsate blanks provide data to evaluate whether or not sampling equipment was free of contamination before being used to collect samples. The rinsate sample results for ground water are directly comparable to ground water sample results. The rinsate sample results for the soil samples are reported in micrograms per liter ($\mu g/L$) and are not directly comparable to the soil sample results, which are reported in micrograms per gram ($\mu g/g$).

Field duplicates provide intralaboratory precision information for the entire measurement system, including sample acquisition, homogeneity, handling, shipping, storage, preparation, and analysis. In addition, they can be used to estimate overall precision of the data collection activity. A total of six field duplicates were collected.

All field QC blank results were compared to the sample results, and any compounds attributable to potential background contamination are discussed below. Field duplicate results that indicate samples are potentially not homogeneous result in the qualification of analytical results as "estimated."

3.2.3 Results of Field Quality Control Samples

None of the eight trip blanks contained reportable concentrations of contamination. Based on this information we can conclude that no volatile organic contamination associated with sample handling and transport occurred.

A total of eleven rinsate samples were collected for this study, at a rate of one per week, ensuring that rinsate blanks were collected for all equipment used for all matrices in this program (i.e., soils, surface and ground water samples). All of these rinsate blanks were collected for all organic and inorganic analyses. For volatile organics, 1,2-dichloropropane was detected above the certified reporting limit (CRL) in three of the blanks with concentrations of 5.0 μ g/L, 6.0 μ g/L and 7.0 μ g/L. Trichloroethene was present in one of the blanks at 2 μ g/L; and chloroform at 1 μ g/L. Because chloroform was detected in field blanks, the deionized water provided by the laboratory might be the likely source of this contaminant. In addition, 1,3,5-trinitrobenzene is present in two of the blanks at concentrations of 1 μ g/L and 2 μ g/L.

For inorganics, eight metals were detected in the rinsate blanks. These were: calcium, detected in two of these blanks at concentrations of 221 μ g/L and 519 μ g/L; sodium, detected in four of the blanks at a range of 306 μ g/L to 450 μ g/L; iron, detected in

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four of the blanks at a range of 147 μg/L to 7,780 μg/L; aluminum, present in two of the blanks at 287 μg/L and 794 μg/L; lead, detected in one blank at 8 μg/L; chromium, at 36 μg/L; barium, at 4 μg/L and 6 μg/L; and manganese, at 27 μg/L and 67 μg/L. The source of these contaminants was investigated: two likely sources are the de-ionization process of the water provided by the laboratory and the decontamination process in the field. USAEC procedures do not allow the use of solvents for decontamination. It is very difficult to achieve complete equipment decontamination without the use of solvents, as evidenced by the results of the rinsate blanks. In order to safeguard against potential cross contamination, the sampling staff implemented the practice of doing a second decontamination of the equipment before sampling the next location. This procedure minimizes the possibility of cross-contamination.

For semivolatile organics, one of the nine field blanks collected for this study had detectable, low concentrations of chloroform at 1 μ g/L and two showed levels of 1,2-dichloropropane at 7 μ g/L and 8 μ g/L; 1,3,5-trinitrobenzene was detected in two blanks at 1 μ g/L. These results are very close to the level of detection and well within a 10 percent margin of error, which suggest laboratory contamination. For inorganics, five metals were detected in field blanks. These were: sodium, detected in two of the blanks at 359 μ g/L and 544 μ g/L; barium in one blank at 5 μ g/L; selenium in one blank at 4 μ g/L; and lead in one blank at 26 μ g/L. In this case, laboratory contamination can also be assumed, but, in addition, there is a possibility that these blanks were affected by airborne contaminants in the field.

All samples were analyzed within holding times according to USAEC requirements. Methylene chloride and acetone in the samples including the field duplicates are more than likely attributable to laboratory background contamination.

3.2.4 Data Validation

As we specified in the QCP (Arthur D. Little, 1993c), 10 percent of the data generated in this study were validated using the USAEC guidelines presented in the USATHAMA QAP, January 1990. The packages were chosen to cover a broad range of analyses and matrices. The Arthur D. Little Chemistry Group assessed these packages for completeness of the documentation provided, adherence to the analytical methods, adherence to the USAEC QC requirements, and acceptability of QC data. They also provided a technical review of the data and verification of the calculation procedures.

The validation process for the data generated to support the FGGM SIA and RIA demonstrated that the data met the data quality objectives (DQOs). No major deviations or problems were noted. Some observations made by our validators revealed a need for the laboratory to improve its documentation practices and to provide necessary raw data to reproduce its calculations. However, none of these

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observations were significant enough to jeopardize the integrity of the data. In addition, these issues were presented to the laboratory and appropriate corrective actions were taken and were fully documented to avoid recurrence.

3.2.5 Data Quality Evaluation

Upon evaluation of the results of the field and laboratory QC samples, we have concluded that the objectives given in the QCP for the data quality indicators (precision, accuracy, representativeness, completeness, and comparability) provide evidence that the program's DQOs were achieved.

Precision - The analytical results of the field duplicates provided precision information for the assessment of the variability associated with field activities, which is a function of samples collection/handling as well as matrix homogeneity. All six field duplicates indicated acceptable precision for both water and soil samples, with the exception of various metals in some soils. This inhomogeneity is most likely due to variable intervals within the split spoon from which soils were collected.

Accuracy - This indicator was assessed as part of the USAEC control chart program. These charts, which are maintained for each control analyte by plotting the recovery of spiked QC samples, monitored the variations in the accuracy of routine analyses and detected trends in the observed variations. Based on our data validation results and the acceptance letters of the USAEC Chemistry Branch, the data generated to support this study met the QCP accuracy objectives.

Representativeness - All sampling locations for the FGGM investigations covered in this project were selected using a targeted sampling design. Representativeness reflects this design and is maximized by proper selection of sampling locations and collection of a sufficient number of samples. The Work Plan provides a very exhaustive description of samples were selected.

Completeness - Even though there was a minimal loss of data due to laboratory instrument failure, the goal of 90 percent completeness was met and exceeded; 99 percent completeness was achieved.

Comparability - In order to increase the level of confidence with which this data set can be compared to another, we ensured that our field team and laboratory were using the appropriate sampling methods, chain of custody procedures, USAEC and EPA methods, adherence to QA/QC program, units of reporting, and correction of measured values to standard conditions.

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3.3 Background Soil and Ground Water Chemistry

3.3.1 Background Soil Chemistry

Background soil samples were collected from 31 locations (at least three per site in the SIA and RIA) at FGGM. We attempted to select sample locations that showed no direct impact from base activities. Our selection was based on known activities, established areas of concern, and visual observations. For example, most of the samples were collected from wooded areas indicating that no buildings or large-scale activities had been conducted recently. The collection of soil samples offpost was outside of our scope of work; however, we anticipate that the selection of off-post locations may encounter similar problems as on-post, i.e., finding an area without anthropogenic impact.

Due to the widespread human impact at FGGM, these samples may be more representative of background concentrations than a pure geologic background. This is particularly true for the RIA and SIA because in those studies we have attempted to evaluate if, and how much specific sites have contributed to environmental contamination. Background conditions for the specific sites are likely to incorporate areas in which other activities have occurred. We have attempted to exclude areas of documented contamination, however, onsite areas that may have had some impact are more likely to reflect the background conditions for specific SIA and RIA areas.

Thirty samples were analyzed for metals and pesticides; the remaining sample was not analyzed due to a possible sheen on the ground water observed by field personnel. Ground water at this location was encountered just below the surface of the soil. The sample was discarded because it was unclear if the sheen indicted that the soil was contaminated, in which case the concentrations would not be representative of background conditions. Figures 3-1, 3-2 and 3-3 are maps identifying the locations for the background samples.

Eighteen of the metals analyzed for were detected (Table 3-2) in the soil samples. Eight metals were present in all 30 samples: aluminum, barium, chromium, iron, lead, magnesium, vanadium, and zinc. Other metals detected at a frequency of 75 percent or more were calcium, manganese, and potassium.

The samples were collected from across FGGM, therefore they likely represent more than one geologic formation. Based on the previous investigations, we believe that the following samples were collected from soils overlying the Lower Patapsco Formation:

- DSY (BKG-16, BKG-17, BKG-18, BKG-22, BKG-23)
- FTA (BKG-13, BKG-14)
- HHA (BKG-7, BKG-8, BKG-9)

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• IL2 (BKG-10, BKG-11, BKG-12)

ODA (BKG-1, BKG-2, BKG-27, BKG-28)

There is some question regarding the samples from CFD, SL, and ASL.

- The CFD samples (BKG-4, BKG-5, BKG-6, BKG-31) are thought to be from soil overlying the Middle Confining Layer.
- Given that the Upper Patapsco Formation pinches out at the ASL, it is likely that the ASL samples are from soil overlying the Lower Patapsco. At the ASL, background sample BKG-30 may represent the Upper Patapsco, but the other background samples are generally west of where the Upper Patapsco pinches out and are more likely to be from the Lower Patapsco. However, because the exact extent of the Upper Patapsco formation is not known, we cannot be certain of the source of these samples. Additional Upper Patapsco samples could not be collected because the area at FGGM where the Upper Patapsco surfaces is largely covered by the active landfill.
- Based on the location of Soldiers' Lake, the SL background samples are probably from the Lower Patapsco, but no drilling has been done at SL to confirm the geology.

The maximum, mean, and detection frequency are summarized for each geologic formation on Table 3-3. In summary, there were 25 samples collected from the Lower Patapsco, 4 from the Middle Confining Layer, and 1 from the Upper Patapsco. The maximum concentrations were generally in the Lower Patapsco with the exception of chromium, iron, potassium, and vanadium that were detected at the highest concentrations in the Middle Confining Layer. Given the distribution of samples between the aquifers, it is difficult to determine separate background concentrations for each. However, the distribution does generally reflect the distribution of the samples collected for site evaluation.

Due to background concentrations and natural variability, it is often difficult to establish which metals are representative of background chemistry. For example, metals such as iron and magnesium are present in all samples and can be naturally present at very high concentrations. Assuming that naturally occurring metals are present at concentrations that represent a statistically lognormal distribution, it is possible to identify populations that fall outside of the distribution, indicating that those concentrations are elevated. This assessment can be conducted through log-frequency analysis. For the analysis, the concentrations of all detected data are plotted logarithmically on the y-axis versus the frequency distribution of the data on the x-axis. The frequency of number was calculated by first ordering and numbering

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all results from lowest to highest. The number of each data point was then divided by the total number of data points plus one and the result was multiplied by 100.

$$F = (D/(N+1)) 100$$

where: F = frequency number

D = data number (the lowest result is assigned a 1, the

second lowest a 2, etc.)

N = total number of data points

Non-detected results are included in the data number count but are not graphed.

The use of the frequency distribution diagrams is to evaluate if the metals generally fall within a single population or if there are notable outliers. We have not attempted to select a single background concentration, rather we used plots to graphically evaluate if the data fell within one population. We would like to note that although this technique was used only qualitatively for this assessment, it is an approach used by EPA Region I staff (including risk assessors). Arthur D. Little has used the frequency distribution technique in conjunction with other methods while working for EPA Region I. This technique has been used successfully to identify outliers from the general population. (Shevenell, Moore and Dreier, 1994, GWMR). This is a qualitative evaluation and has only been used as such. Frequency distribution graphs are included for three metals: chromium, lead, and nickel. These metals were selected due to the possibility that they have been identified at potentially elevated levels in ground water.

- Chromium was detected in all 30 soil samples. All of the concentrations fall on a straight line, indicating a natural distribution (Figure 3-3).
- Lead was detected in all 30 samples. Only two samples, both from the IL2, fall
 outside of the population (Figure 3-3).
- Nickel was detected in 13 of the 20 samples. All but one sample, BKG-12 from the IL2, fall on a straight line (Figure 3-4).

As indicated by the plots for the three metals, most of the metal concentrations fall within single populations. A total of three samples fell outside of the lognormal distribution for the three metals graphed. All of those samples were collected from either the IL2 or the CFD.

The elevated concentrations may be due to either natural variability or human impact. Although an effort was made to collect samples from unimpacted areas, impact was often difficult to identify or confirm. The IL2 and the CFD samples may have been

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from areas in which some dumping has occurred; unnatural land forms (i.e., possible debris piles) were identified in both areas. An additional discussion of the background metals is included in Section 8.0 along with the metals data for the ODA soil samples.

One or more pesticides were detected in 10 of the 30 background soil samples (Table 3-2). A total of four pesticides were detected. With the exception of greater than $0.1 \mu g/L$ of heptachlor-epoxide in BKG-8, the highest concentrations of pesticides are:

- 0.016 μg/L p,p-DDE in BKG-8
- 0.016 µg/L p,p-DDT in BKG-8
- 0.016 μg/L heptachlor epoxide in BKG-13

In general, low concentrations of pesticides are present in some samples. This corresponds with the ground water data from the RI and SI. Although pesticides were common in ground water, no compound with an MCL exceeded its standard. Therefore, although pesticides are ubiquitous in all media at FGGM, they are present at very low concentrations.

It should be noted that, with the exception of the ODA, the background soil data collected during the SIA and RIA are not being used for direct comparison with site data. At the ODA, the background metal data were combined with the site data to plot frequency distribution diagrams. These diagrams indicate that not only do some of the ODA metal concentrations fall outside of the population, but also some of the background soil samples do. This is in agreement with the earlier comments that some of the selected background locations may be impacted by anthropogenic activities and, therefore, may represent elevated metal concentrations. However, the conclusions made for the ODA are based on the spacial and vertical distribution of metals in ODA samples and not on the comparison of the ODA samples with the background data. Therefore, the background data have not been used to determine whether the metals are present in elevated concentrations, or if future determinations are needed.

In summary, we have concluded the following regarding the background soil sample collection and data:

 Although we made an attempt to collect samples from undisturbed locations, it is likely that many of the samples were collected in areas of at least minimal human impact. However, the samples are still representative of background for individual sites.

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 There may be some change in soil chemistry between the geologic formations, but, given the discrepancy in total number of samples collected from each formation, the data are difficult to compare.

- The background concentrations are not directly compared against any site data and are not used to rule out other metal concentrations as being below background.
- The risk assessments include all chemical data regardless of how the concentrations compare against background concentrations.

3.3.2 Background Metal Concentrations in Ground Water

Background metal concentrations in FGGM ground water generally were determined on a site-specific basis. When possible, an upgradient well was used to represent the background concentration. However, this procedure was complicated in areas in which there was no clear upgradient well; this may be due to the presence of upgradient sources, radial ground water flow, or lack of a correctly placed well. The following specific problems were encountered in attempts to establish background metal concentrations:

- DSY: Chlorinated volatile organic compounds (VOCs) were detected in the most upgradient well in this area, indicating either an additional source exists or that the DSY source is larger than estimated. Therefore, background metal concentrations could not be determined for ground water.
- FTA: No background concentrations were established at this area because none of the wells was located directly upgradient of the source area.
- HHA: The most upgradient well at the HHA contains arsenic, cadmium, and lead above maximum contaminant levels (MCLs), therefore, the metal concentrations were considered to be above background.
- IL2: There is no upgradient well for this area. The most upgradient wells are
 located cross-gradient of the source area. However, there is the potential for radial
 flow in this area, so an upgradient location may not exist for background
 purposes.
- ODA: The most upgradient well was found to contain chlorinated VOCs, therefore, no background locations exist for ground water in this area.
- ASL: Various methods were used to determine background metal concentrations at the ASL. Table 4-12 in the RIA contains a comparison of background metal data for the ASL. The data includes three separate, published sources specific to the

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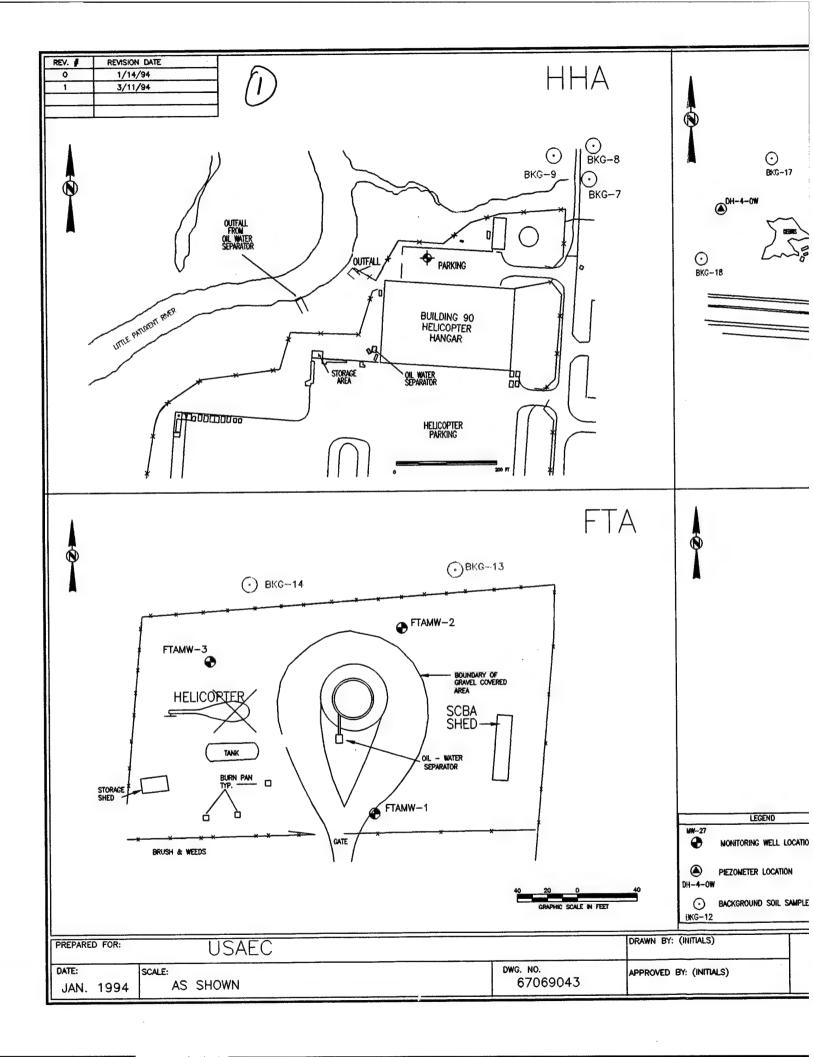
Patapsco Aquifer in Anne Arundel County. We have also included data from upgradient wells for both aquifers over two different sampling events. On Table 4-13 in the RIA, the chemical data from the Upper Patapsco Aquifer are compared against the published and upgradient background concentrations. On Table 4-16 the chemical data from the Lower Patapsco Aquifer are compared against the published and upgradient background concentrations.

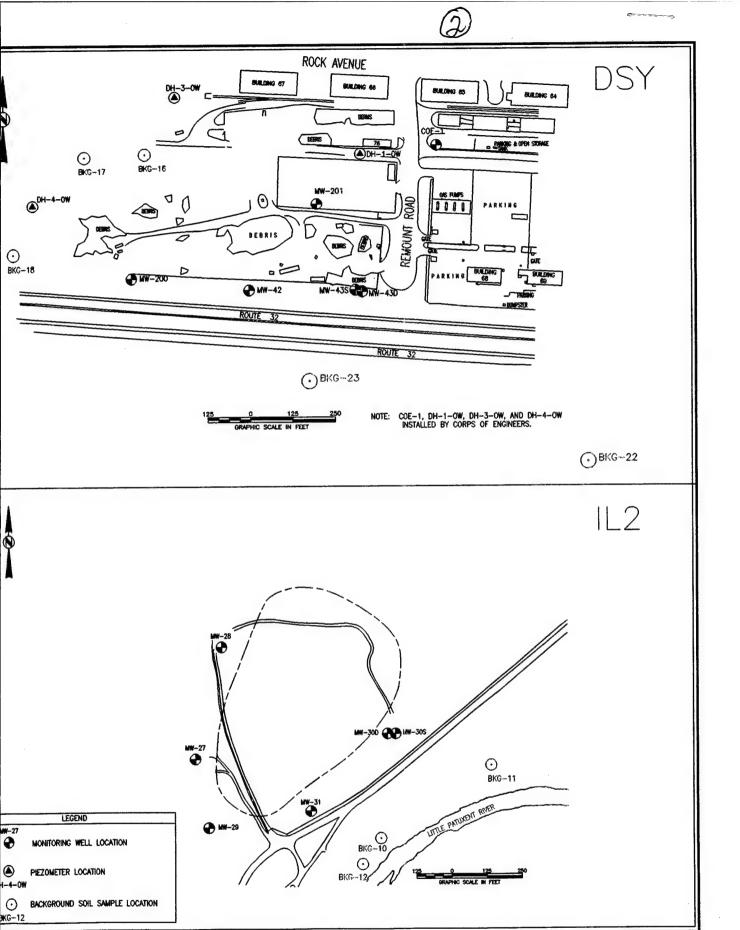
 CFD: A chlorinated VOC was detected in the upgradient well along with lead and chromium above MCLs, therefore, no background concentrations were established for this area.

Due to the problems in determining background metal concentrations at the SIA and RIA sites, we used MCLs to determine when metal concentrations were elevated. Additionally, at the CFD and the ASL, where risk assessments were conducted, all metals were included in the assessment. No metals were excluded from the risk assessment because they were below background. Therefore, the risk assessment conservatively includes both background metals and site-contributed metals.

According to EPA Region III guidance, Draft Guidance on Selecting Analytical Metal Results from Monitoring Well Samples for the Quantitative Assessment of Risk¹, dissolved metal concentrations could be used in place of total metal concentrations for the risk assessment. This is based on the nature of the aquifers (primarily medium sand). However, the human health risk falls above the EPA's acceptable risk criteria (incremental cancer risk of 10⁻⁶ for carcinogenic risk; hazard index of 1.0 for non-carcinogenic risk) regardless of whether the dissolved or total metal concentrations were used.

¹ EPA Region III Guidance. August 10, 1992.

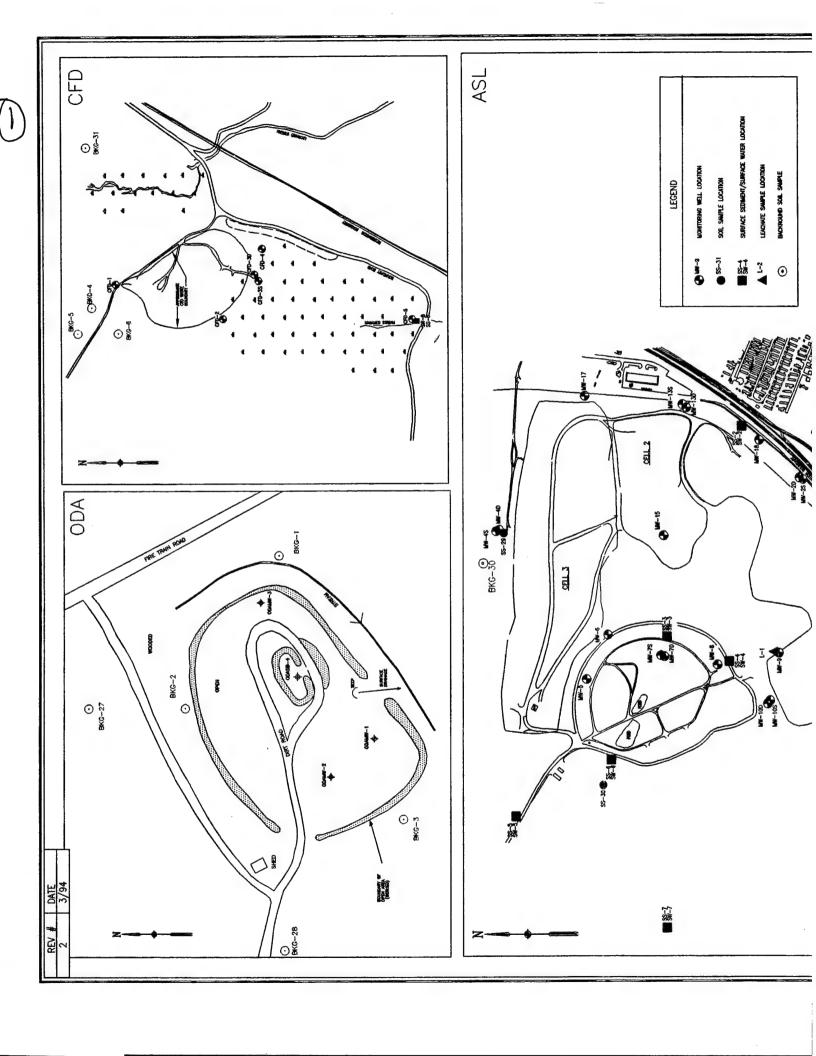


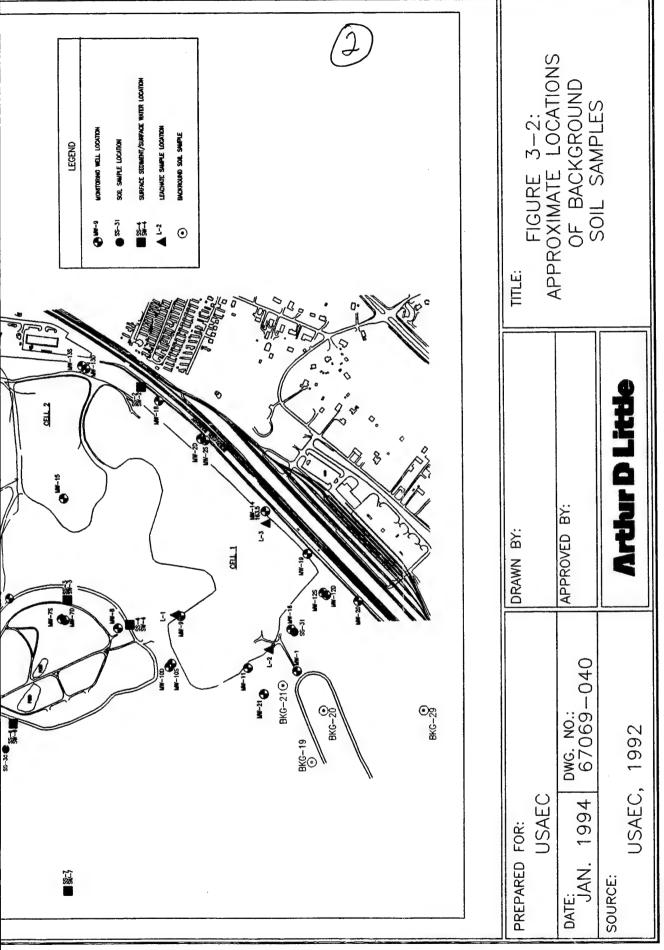


(INTIALS)

Arthur D Little

FIGURE 3-1:
APPROXIMATE LOCATIONS OF
BACKGROUND SOIL SAMPLES





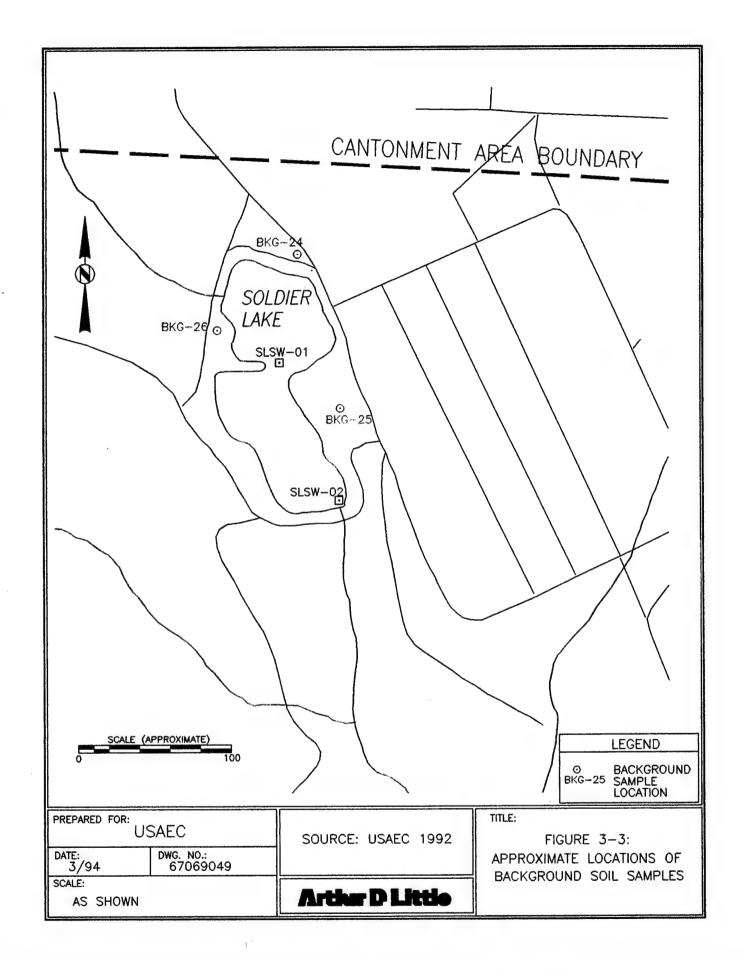
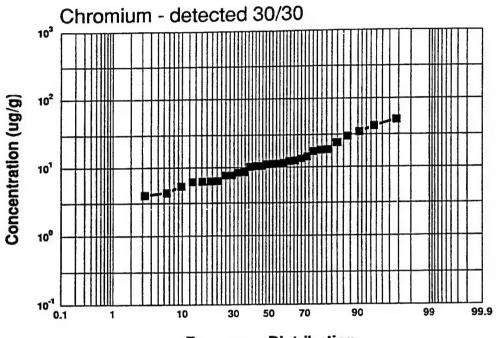


Figure 3-4: Frequency Distribution of Chromium and Lead in Background Soli Samples



Frequency Distribution

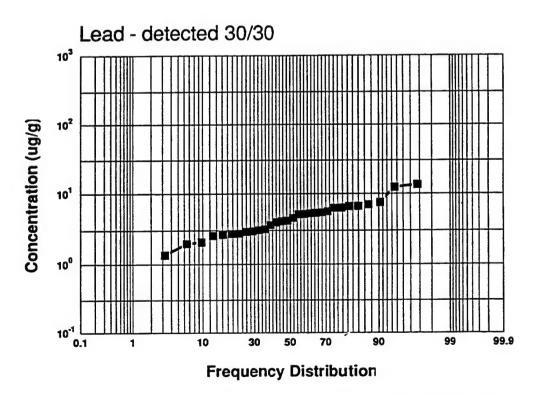


Figure 3-5: Frequency Distribution of Nickel In Background Soil Samples

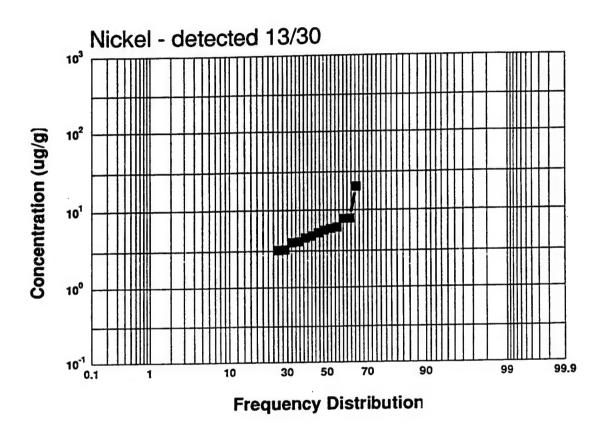


Table 3-1: Federal Standards for the FGGM RIA and SIA (Page 1 of 2)

Analyte	Federal Drini Water Stands MCL Si ug/L	irds MCL/MCLG	Ambient Wa Guality Crits Maximum C 199/L	wia .	Health Advisory ug/L	NOAA ER-L ug/kg	ER-M ug/kg
VOLATILE ORGANIC COMPOUNDS	ogs.	- Wy.					coccinci :abdo.
						l	
Aromatics		•				1	
carbon tetrachloride	5	0 G	_		_	-	
toluene	1,000	1,000 G	-		_	_	_
1,4-dichlorobenzene	75	75 G	_	_	_	_	_
benzene	5	0 G	_	-	_		
chlorobenzene	_	_	_		_	_	_
dichlorobenzene	75	75 G(1)	_			-	-
ethylbenzene	700	700 G	_	_	_		_
xylenes	10,000	10,000 G	_	_		_	_
Halogenated VOCs							
chloroethane	_	_	_	_		_	_
chloroform	100	0 G(2)	-	_		-	_
chloroethene	_	_	_	_		-	_
1,1-dichloroethane	-	— G	_	_	_	_	_
1,2-dichloroethenes	_	70 G(3)	_	_	-	_	
1,2-dichloropropane	5	0 G	-		_	_	_
trichlorofluoromethane	_		. –	_	_	_	_
tetrachioroethene	5	0 G	_		_	_	-
trichloroethene	5	0 G	I -		_	_	_
1,1,2,2-tetrachloroethane	_	-	_	_		_	_
Other							
4-methyl-2-pentanone	_	_	_			_	_
trichlorofloromethane	_		_		_	-	_
SEMIVOLATILE ORGANIC COMPOUNDS							
bis(2-chloroethyl)ether	-	_	_	-	_	_	
bromocil	_	_	l –	_	_	_	
4-chloro-3-creosol		_	_		_	_	_
1,4-dichlorobenzene	75	75 G	_	_	_	_	_
diethyl phthatlate	_	_	_			_	_
2,4-dimethylphenol	_	_	_			_	_
2-methylphenol	_	_	_			_	_
4-methylphenol	1 –	_	_	_			
naphalene	1 -	_	_	_	-	-	_
EXPLOSIVES							
RDX	_	_	_		2	-	_
HMX	-	. –	_	-	400	_	_

Table 3-1; Federal Standards for the FGGM RIA and SIA (Page 2 of 2)

Analyte	Federal Dr Water State		Ambient W. Quality Crit Maximum C	eria .	Health Advisory	NOAA ER-L	ER-M
	ug/L	ug/L	ugiL	ug/L	ug/L	ug/kg	ug/kg
CONVENTIONAL PARAMETERS							
chloride	-	250,000	_	-	_	_	_
sulfate		250,000	_		-	-	_
nitrate	10,000	10,000 S	-	_	_	-	_
total dissolved solids	_		-	_	_	_	-
METALS							
silver	-	100 S	4	_		1,000	2,200
aluminum	_	50-200 S	_	_	_	_	
arsenic	50		360	190		33,000	85,000
boron	_	_	_	_		_	_
barium	2,000	_	_	_		_	
beryllium	4	_	_	_		_	_
calcium	_	_	_		_	_	
cadmium	5		4	1		5,000	9,000
cobalt	-	_	-	_	_	_	_
chromium	100	_	16	11	_	80,000	145,000
copper	1,300	1,000/1,300 S/G (4)	18	12	_	70,000	390,000
iron	_	300 S	_	_		_	
potassium	_	_	_	_	_	_	
magnesium	l _						_
manganese	_	200 S	_	_		_	
mercury	2	_	2	0		150	1,300
sodium	_	_	_	_	_	_	_
nickel	100		1,400	160		30,000	50,000
lead	15	— (5)	82	3		35,000	110,000
antimony	6	_ (-)	_	_	_	2,000	25,000
selenium	50	_	20	5		_	
tin	1 -	_	_	_		_	_
tellurium	_	_	_	_		_	
thallium	2	_	_		_		_
vanadium	_	_		_	_	_	_
zinc	_	5,000 S	120	110	_	120,000	270,000

NOTES

Table includes all detected metals, and VOCs/SVOCs that have standards

MCL=maximum contaminant level; G=MCL goal (MCLG); S=secondary MCL (SMCL)

NOAA - National Oceanographic and Atmospheric Adminstration Sediment Guidelines

Drinking water standards and health advisories apply to ground water;

Ambient Water Quality Criteria apply to surface water

NOAA guidelines apply to sediment

- (1) standard for m- and o-dichlorobenzene (75 ug/L for p-dichlorobenzene standard)
- (2) standard for total trihalomethanes
- (3) standard for cis-1,2-dichloroethene (100 ug/L for trans-1,2-dichloroethene)
- (4) copper has an action level of 1,300 ug/L, a SMCL of 1,000 ug/L and a MCLG of 1,300 ug/L
- (5) lead has an action level of 15 ug/L

TABLE 3-2: Metals and Pesticides Detected in Background Solis Page 1 of 3

Site ID Field Sample ID Site Type Start Depth (it bgs) End Depth (it bgs) Collection Date				B1A0001Y AHOL 0 0 26-Jan-93	BKG-2 B1A0002Y AHOL 0 0 26-Jan-93	BIA0003Y AHOL D Bedian-93	BKG-27 B1A0027Y AHOL 2 18-Jan-94	BKG-28 B1A0028Y AHOL 2 2 18-Jan-94	BIADODAY AHOL 2 2 2 28-Jan-93	BIADODSY AHOL 2 2 28-Jan-93	BIADOBY AHOL 2 2 2 2 2 2 2 2 2 2 2 2 2	Brandir
Closest She METALS (ug/g)	MAX	MEAN	DETECTED	CDA	CUA	ODA	ODA	AUG	GES .	G-10	9	GEA.
Aluminum	27,400	7,762	-	4,680	10,500	8,220	10,500	8,560	10,300	24,900	19,600	1,240
Barium	85	33.9	8 8	18.9	9.96 9.96	. 82	33.7	24.8	22.2	53.1	44.1	8.21
Beryllium	2.27	1. 5 5. 5	_	. 420	, c	, 8		•	' -	- 28	8.5	•
Calcium	19,100	919		600	\$ 5	95.5	42.5	' ' 8	. ' .	34.4	į ' L	8
Cobalt	18.5	4. ru 3. co	-	''	3.55	5.01	12.	3 '	16.2	40.2 4.96	φ. υ.	S
Copper	23.6	8.9		4.8	533	5.250	4.66	12.3	7.64	16.3	22.8	3050
Lead	13.5	4.9		5.16	5.42	6.3	7.05	6.61	4.54	6.69	7.56	.8
Magnesium	4,760	653	-	273	776	499	510	297	264	808	1 2	=
Manganese	000,	127	-	19.8	65.9	51.6	17.6 3.88	•	20.6 7.0.6	86.3 7 84	16.8	15.3
Potassium	1,400	437		217	555	351	88	. 8	88	400	g ge	1
Sodium	8	282	-	, 5	' 8	. 797	' 900	' 0	' 6	86.4	62.7	1 8
Vanadum	9.09	13.6 5.53	_	8.84	18.8	12.4	19.4	14.2	2.4	21.3	5 2	3.83
Heavy Metals	79	8		13	93	21	27		35	61	6/	ဖ
Grand Total Metals	72,896	22,447		10,656	22,526	14,554	23,976	31,259	27.741	69,750	72,896	5,342
PESTICIDES (ug/g)												
p,p'-DDE	0.016	0.001	90	1	i	1	1	I	1	1	1	1
Endosulfan II	0.00	000	- •	1 900 0	1 0000	1000	1	1	1 1	1 1	1 1	1
Heptachlor Epoxide	000	98	4 8€	9 1	9 1	600	1	ı	0.003	1 1	1 1	1 1
												,

NOTES.
Only detected analyties are included on this table, for full data set see the appropriate appendix Dashes (-) indicate that the analytie is present below detection limits

TABLE 3-2: Metals and Pesticides Detected in Background Soils Page 2 of 3

4970 11,400 8,240 7,580 12.9 12.9 24.8 35 142 0.751 12.9 26.6 35 142 0.751 12.9 22.5 10.6 21.9 12.0 12.4 18.1 10.6 10.6 10.6 12.4 18.1 10.6 10.6 10.6 10.6 10.6 10.6 10.6 10	3 3 28-Jan-93 28-Jan-93 28- HHA HHA	28-Jan-93 28-Jan-93 HHA	AHOL 2 28-Jan-93 2 H.2	28-Jan-93	ZB-Jan-93	AHOL AHOL 2 2 2 28-lan-83 FIA	2 28-lart-83 FTA	BIADOIBY AHOL 2 2 3 02.Feb.93 DSY	02Feb-93	AHOL 2 2 3 02-Feb-93 1 DSY	1 A00227 1 AHOL 2 3 3 18-Jun-94 DSV	AHOL AHOL 2 2 2 3 16-Jan-84 DSV
8,970 11,400 8,240 7,580 9,87 24,8												
12.9 26.6 35 142 8.96 9.25 10.6 21.9 12.4 18.1 10.6 10.6 12.4 18.1 10.6 10.6 19.500 32,600 6,480 9,200 1 3.59 5.36 4,17 13.5 20.7 45.7 889 4,760 11.6 - 62.6 1,300 29.7 31.7 14.6 50.7 5.66 45.154 16.329 43.780		8,240	7,580	1,910	27,400	2,960	7,730	6,630	7,700	4,350	9,230	3,380
8.96 9.25 10.6 21.9 1.24 12.9 23.2 147 19,100 12.4 18.1 10.6 10.6 10.6 10.6 10.6 10.6 10.6 10		38	142	9.49	. 85	11.3	29.1	31.4	30.1	2.1.8 8.1.8	37.8	19.3
129 232 147 19,100 12.4 18.1 10.6 10.6 4.94 8.53 4,55 5,29 19,500 32,600 6,480 9,200 1 3.59 5,36 4,17 13.5 207 457 889 4,760 1,300 11.6 - 62.6 1,300 - 333 408 679 29.7 31.7 14.6 50.7 5.66 7.5 13.4 14 5.66 45,154 16,329 43,780		10.6	2.70		102	, I	128			• •	•	•
8 (ug/g) 4.94 8.53 19.500 3.590 3.590 5.294 4.08 5.29 4.05 5.29 4.05 5.29 4.05 5.29 4.05 5.29 4.05 5.29 4.05 5.29 4.06 5.29 6.11 13.5 5.29 13.5 5.29 13.5 5.29 13.5 5.29 13.5 5.29 13.5 5.29 13.5 5.29 13.5 14.6 13.5 14.6 14.		147	19,100	5 2 2 2	1,70	63.3	195	52.3	225	179	38.5	25
8.53 4.55 5.29 19,500 32,600 6,480 9,200 1 3.59 5.36 4,17 13.5 27 457 889 4,760 11.6 - 62.6 1,300 - 333 408 679 874 679 875 81.7 14.6 50.7 5.66 45,154 16,329 43,780		29.	408	5.29	18.2	3 '	? '	2	3 '	i	4.74	9
3.59 5.36 4.17 13.5 2.07 4.57 889 4.760 11.6 - 62.6 1,300 2.9.7 31.7 14.6 50.7 5.66 45.154 16.329 43.780 - 0.016		4.55	5.23	4.68	13.4	'!	' ;	23.4	5.3	23.6	6.28	•
207 457 889 4760 11.6 - 62.6 1,300 11.6 - 62.6 1,300 - 333 408 679 29.7 31.7 14.6 50.7 5.66 7.5 13.4 14 5.66 45.154 16.329 43.780		0,480	9.50	008,11	28,200	4,770	8,530	26,500	00,1	18,400	16,300	5,370
s 29.7 31.7 14.6 50.7 50.7 51.8 6.79 894 5.66 7.5 13.4 14.6 50.7 5.66 45,154 16,329 43,780 1 2.0 5.00 6.7 5.00		- 68 - 68 - 68	4,760	25 211	3,200	8 8 8	741		2. 18. 2. 18.	7, V.	2.5 7.50 7.50	45.5 869
s 29.7 31.7 14.6 50.7 5.66 7.5 13.4 14.6 50.7	11.6	62.6	000	95.9	1,290	31.3	33.8	55.6	49.9	13.4	47.9	49.4
29.7 31.7 14.6 50.7 5.6 7.5 13.4 14.	33.	6.1 6.1 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1	3.97 679	3.1 192	250	241	5.16	' 68	242	, 25	4.71 350	• •
29.7 31.7 14.6 50.7 5.66 7.5 13.4 14.6 50.7 14.6 50.7 14.6 5.66 48.21 29 29 14.906 45.154 16.329 43.780 14.08/9)		•	88	. *	96.1	'	•	<u>'</u>	'	3 '	} '	•
Lug/g) 26 48 21 29 29 43.780 14 (ug/g) - 0.016 - 0.016		13.4	50.7 14	14.4 9.59	41.8 60.6	8.79 7.07	15.4	23.3 13.8	16.2	16.4	20.1	8.25
(ug/g) 24,906 45,154 16,329 43,780		21	83	8	88	60	21	8	5	8	24	6
- 910'0 - (6/6n)		16,329	43,780	14,374	64,60	8,501	17,709	34,089	19,778	23,262	26,801	6.267
91000 -		_										
1	- 0.016	1	1	ı	1	1	1	1	1	1	1	1
		ı	1	1	1	1 !	0.001	1	1	1	1	1
Popular	0.016	1 1	0.01	1 1	0.007	0.007	0.003	11	1 1	1 1	1 1	11

NOTES: Only detected analytes are included on this table, for full data set see the appropriate appendix Dashes (-) indicate that the analyte is present below detection limits

TABLE 3-2: Metals and Pesticides Detected in Background Solls Page 3 of 3

Site ID Field Sample ID Site Type Start Depth (it bgs) End Depth (it bgs) Collection Date Collection Site	BKG-19 B1A0019Y AHOL 2 3 02-Feb-93 ASL	B1A0020Y AHOL AHOL 2 2 3 02-Feb-93 ASL	B1A0021Y AHOL AHOL 2 2 3 02-Feb-93 ASL	BrG-28 BrA0029Y AHOL 2 24-Jen-84 ASL	BIA0030Y BIA0030Y AHOL 2 24-len-94 ASL	BKG-24 B1A0024Y AHOL 2 2 19-Jen-94 SL	B1A00257 B1A00257 AHOL 2 2 3 19-Jan-94 3L	B1A0026Y B1A0026Y AHOL 2 3 19-Jan-94 SL
METALS (ug/g)								:
Aluminum	4,610	4,330	1,650	3,600	5,380	4,010	3,790	3,520
Barium	17.6	35.2	11.1	16.1	17.6	808	14.4	33.8
Beryllium	1	•	•	•	•	•	•	•
Boron	. 60	' '	, \$	' \$, 94	' 6	' 5
Chromium	6.41	5.38	900	38	. T	77.7	8.52	11.6
Cobalt	•	•	•	•	•	•	•	•
Copper	4.93	5.41	3.65	' '	•	3.57	3.7	1
Ton	2,580	9,690	4,990	6,100	8,570	6,970	7,010	065'/
Lead	3.13	2.72	500	2.93	90.0	2.69	2.89	8.9
Magnesium	382	367	82	A S	312	3/3	98	8
Manganese	39.4	98	19.4	22.9	24.2	35.2	32.3	40.3
Potassiim	. 233	· 60				176		585
Sodim	} '		•	•	•	•	•	•
Vanadium	12.1	12	8.79	9.51	15.8	11.7	10.2	19.6
Zinc	8.27	7.57	3.82	8.1	97.6	8.72	10.2	53.9
Heavy Metals	5	80	9	0	14	14	16	8
Grand Total Metals	12,944	11,733	6,849	10,143	14,388	11,786	11,213	11,988
PESTICIDES (ug/g)								
0.0'-DDE	ı	1	1	'		1	1	ı
Endosulfan II	1	1	:	1	1	1	!	1
TOO-0'd	1	1	1	1	1	1	1	ı
Heptachlor Epoxide	1	1	1	1	1	•	I	1

NOTES: Only detected analytes are included on this table, for full data set see the appropriate appendix Dashes (--) indicate that the analyte is present below detection limits

SI Addendum: FGGM Section No.: 4.0

Revision No.: 1

December 1995 Date:

4.0 Physical Characterization and Contaminant Assessment of the DPDO Salvage Yard and Transformer Storage Area (DSY)

4.1 Introduction and Background

The DPDO (currently known as the DRMO) Salvage Yard and Transformer Storage Area (DSY) is located off Remount Road south of Rock Avenue and immediately north of Route 32 (Figures 1-2 and 4-1). The facility is used as a storage area for a variety of equipment, including discarded vehicles, electrical transformers, electronic equipment, heating and cooling units, pipes, dumpsters, and scrap metals. During an Arthur D. Little site visit (Arthur D. Little, 1992), approximately seven transformer bodies and 15 transformer insides were observed on pallets immediately inside of the salvage yard gate. The majority of the bodies were labeled "no PCBs" or "<10 ppm PCBs." One body was labeled "27 ppm PCBs." The site includes approximately eight acres and is generally not vegetated.

An SI was conducted for this site in 1992 (EA Engineering, Science and Technology, 1992b). The results of that investigation are summarized below. However, for a detailed description of the investigation, refer to that document.

During the SI, one deep well and two shallow monitoring wells were installed along the south boundary, between the DSY south fence and Route 32. All of the SI wells were installed south of the DSY and screened in the lower Patapsco, which acts as an unconfined water table aquifer in this area. Ground water samples were collected from the three new monitoring wells and one existing well, COE-1.

During the SI, ground water flow was evaluated using the three new wells, COE-1, and three existing piezometers. The direction of ground water was determined to flow from the west toward the east/northeast.

VOC contamination was detected in the two shallow, upgradient wells (MW-42 and MW-43S) and not in either the deep well (MW-43D) or the existing well (COE-1). The MCL for PCE was significantly exceeded at MW-42, which is located west of the well cluster MW-43S and MW-43D. Low levels SVOCs (MW-43D) and pesticides (MW-43D and COE-1) were detected but none of these compounds exceeded MCLs. Chromium and lead contamination exceeding the MCL or Action Level was detected at MW-42 and COE-1.

VOC contamination was detected in the upgradient monitoring wells with the higher concentrations detected at MW-42, which is further upgradient. The location of the source of contamination and extent of the contaminant plume were not determined during the SI.

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Low concentrations of pesticides and PCBs were detected in the soil sample collected near the transformer storage area. In an earlier study (USAEHA, February 1992), significant PCB contamination was detected in the soils located in the southwestern corner of the property. Contamination was determined to extend to a depth of 5 feet in some areas.

4.2 Summary of Investigation for Study Area

The overall objectives of the SIA field investigation at the DSY were to (1) further characterize the presence of PCBs in soil near the transformer storage area; (2) provide further information regarding the location of the contaminant source and to monitor ground water quality downgradient of the previously detected contamination; and (3) confirm the presence or absence of previously detected ground water contamination by resampling all existing wells. The tasks conducted to achieve these objectives included:

- · Completion of a down-hole survey for UXO
- · Installation of two additional shallow (lower Patapsco) monitoring wells
- Analysis of eight ground water samples from the water table aquifer (lower Patapsco); seven samples were to be collected close to the surface of the aquifer and one was to be collected close to the bottom of the aquifer
- · Analysis of six surface soil samples for PCBs

Two monitoring wells were installed with their screened intervals intersecting the water table. MW-200 was installed along the southern boundary of the DSY, approximately 300 feet west of MW-42. The purpose of this upgradient well was to determine if contamination extends west of the known contamination at MW-42 and to delineate the contaminant plume. A second shallow well, MW-201, was installed downgradient of MW-42 and MW-200 to evaluate if the contaminant plume is migrating with ground water. All sampling locations are illustrated on Figure 4-1.

A total of eight ground water samples were proposed to be collected, two from new monitoring wells, four from existing monitoring wells, and two from existing piezometers. Ground water samples were not collected from either of the piezometers because the diameter of the piezometers' PVC risers was too narrow for sampling equipment capable of collecting a representative sample.

Due to a proposal to erect a building encompassing most of the area where MW-201 was proposed, approval was granted to install the well with the expectation that it will be lost when the building construction begins.

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During the 1992 SI, low levels of PCBs were detected in the transformer storage area of the DSY. A study conducted by the U.S. Army Environmental Hygiene Agency (1991) indicates that high levels of PCBs are present in the southwest corner of the property; however, this information was not available prior to the 1993 SIA field activities. Therefore, a total of six surface soil samples (0 to 6 inches) were collected from the transformer storage area in the northeast portion of the property to evaluate the presence of PCBs in this area of the DSY.

4.3 Physical Characterization of the Study Area

4.3.1 General Description

The DSY is predominately covered by barren ground and impervious surfaces (roads and buildings). This property is used as a developed material-staging/disposal area. The site is primarily unvegetated; however, the areas adjacent to the northwestern and western portions of the site are fairly vegetated. The property is divided into two yards that are separated by a fence. The northernmost yard is completely enclosed by the fence whereas the southernmost yard is only surrounded on three sides by the fence. The western boundary of the southern yard opens to a wooded area. A hill on which a fence is placed bounds the southernmost border, with the DSY yards located approximately 10 feet below on the northern side, and Route 32 is approximately 20 feet below on the southern side.

Items that can be used for scrap metal, e.g., excess cars, tanks, and household appliances, are stored here. Other items including unused toilets, inert ordnance used for training, and transformers were observed. There are no paved roads inside the DSY yards and the access paths change as piles of debris and materials are moved around the yards. Access into the DSY yards can be gained through locked gates located along the eastern border. Because of the scrap metal and frequent thefts, the gates remain locked at all times except during business hours while work is conducted in the yards. Activity within the yards varies weekly.

4.3.2 Geology

The DSY's location suggests that it is situated on the lower Patapsco Formation, which is described as consisting of fine, silty sand grading downward into a coarse medium sand with minor silt. The geotechnical samples collected from the DSY during the SIA are primarily well sorted, medium- to fine-grained sand with silt and clayey silt lenses to a depth of 61 feet. The soil characteristics described in the SIA soil boring logs deviate slightly from the soil summary provided during the SI; however, the soil characterizations described in the SIA field logs are representative of the lower Patapsco Formation. The soil descriptions provided for MW-43S and MW-43D, which are located further to the east, best represent the lower Patapsco Formation according to the Maryland Geological Survey. The differences in the descriptions are likely the result of variable interpretation, including: soil color, grain

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size, sorting, and differentiating silts and clay. Additionally, the SI (EA Engineering, Science and Technology,1992b) reported the presence of a clay lens at a depth of 25 feet, which was not encountered during the 1993 SIA; however, this can be accounted for by the distance between the wells.

4.3.3 Hydrogeology

The unconfined aquifer present at the DSY is the lower Patapsco aquifer. All of the shallow monitoring wells at this location have their screened intervals intersecting the water table. One deep well is screened 46 feet into the water table but is still in the lower Patapsco aquifer. The explanation provided in the SI for the construction of the deep well was evaluation of the lithology (EA Engineering, Science and Technology, 1992b).

A complete round of depth-to-water measurements was collected on February 23, 1993. The measurements are reported along with their corresponding water level elevations on Table 4-1. Ground water elevations ranged from 119.92 to 137.96 feet MSL. Water level elevations in the clustered shallow and deep wells are similar. This indicates that there is no significant vertical hydraulic gradient.

In determining the direction of ground water flow, some unusual findings were reported with regard to the water levels in wells located along the southern boundary. The depth to water at MW-200 was significantly lower than in the neighboring wells. If the water level at MW-200 was excluded from the water level survey, the direction of ground water flow would concur with the east/northeasterly direction concluded in the SI. However, MW-200 cannot be excluded as a data point and thus raises the question about the difference in its water level measurements. Several possible explanations were offered for these observed inconsistencies and consequently investigated to evaluate their feasibility.

The proposed explanations for the observed differences included (1) surveying error, (2) error in transcription of depth-to-water level measurements by Arthur D. Little, (3) a subsurface geologic trough, (4) nearby pumping wells in the water table aquifer creating a drawdown curve in the area of the DSY, and (5) a subsurface ground water mounding at MW-43S and MW-43D from a nearby drainage ditch. The following steps were taken to evaluate each of the proposed theories:

• The surveyors were contacted and asked to verify that the coordinates they gave Arthur D. Little were correct. The survey data were originally reported in dadum NAD 83 and had to be converted to NAD 27 so that they could be manipulated to generate maps. After the survey data were converted the points were consistent with the survey data provided from the SI.

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 The depth to water level measurements entered into the field log books, soil boring logs, well development logs, and water sampling logs were compared to determine whether any errors in transcription occurred. All four readings were consistent, thus error due to transcription or mismeasurement was eliminated as a likely cause.

- The Maryland Geological Survey was contacted to determine whether there is any
 information available about this aquifer with respect to ground water flow and
 subsurface terrain. MGS stated that the ground water flow in the lower Patapsco is
 well documented for the southern part of the state; however, very little
 information about ground water flow and subsurface geology is available for the
 northern part of the state.
- The FGGM Water Treatment Facility was contacted to determine whether there
 are any production wells located in the lower Patapsco aquifer close to the DSY
 that could be influencing the ground water flow. All of the FGGM production
 wells are situated in the lower confined aquifer, the Patuxent, and would therefore
 be unlikely to create a drawdown curve in the lower Patapsco aquifer.
- During a recent site visit, a drainage ditch was observed along Route 32, below MW-43S and MW-43D. This drainage ditch collects surface water runoff from the road and directs it in an easterly direction adjacent to the DSY property.
 Significant amounts of precipitation could cause mounding to occur in this area resulting in the depth-to-water measurements in these wells to be unnaturally high. This may result in MW-200 appearing to be low when it is representative.

The ground water contour map presented as Figure 4-2 excludes the water level data from MW-200. The resulting map is consistent with the SI report. If MW-200 is included, the contour lines are bent around MW-200, creating a ground water trough trending northeast-southwest.

Thus, the direction of ground water flow at this site cannot be concluded with a high degree of certainty. Because of the uncertainty regarding the depth-to-water measurement at MW-200, the contour map presented excludes the elevation at this location. Further investigation is needed at this site to understand the relationship between the elevation measurements at MW-200 and ground water flow direction. If the water level at MW-200 is consistent with the subsurface geology at this site, it is possible that ground water underneath the DSY is flowing toward MW-200.

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4.4 Nature and Extent of Contamination

During the SIA field investigation, soil and ground water samples were collected to evaluate the nature and extent of contamination. The results of these sampling efforts are described below. The data tables presented in this section provide a summary of the samples in which analytes were detected. A complete summary of the data for each sample can be found in Appendix H. Table 4-2 provides a complete summary of the laboratory samples collected at the DSY, including site IDs, site types, media codes, and analytical parameters.

4.4.1 Soil

Six shallow (0 to 6 inches) soil samples were collected from the transformer storage area and analyzed for PCBs. Historically, PCBs have been added to oils stored in transformers because of their low flammability properties. PCBs have been reported in soil samples collected from the DSY during previous investigations. The locations for these samples are illustrated in Figure 4-3.

PCB Aroclor 1260 was detected in all of the surface soil samples but one (Table 4-3), which was collected from the transformer storage area. This is the same PCB identified during the SI (EA Engineering, Science and Technology, 1992b). The highest concentration of PCBs measured during the 1993 SIA was 4 mg/kg at SS-201. This is below the action limit of 50 mg/kg established by EPA under TSCA.

Two separate investigations of the DSY property were conducted in 1991: an SI was conducted by EA Engineering, Science and Technology and PCB investigation was conducted by the U.S. Army Environmental Hygiene Agency (USAEHA, 1992). The PCB concentrations detected during the 1993 SIA were consistent with the PCB results reported by EA during the 1991 SI. USAEHA collected samples, at three different depths, from 32 locations throughout the property. The action level was exceeded at one sample location, SS-27, located in the southernmost lot, southwest of the 1993 investigation area. The total PCB concentration measured in SS-27 was 92.99 mg/kg with 83.5 mg/kg found in the 1 to 3 foot interval. The radial extent of contamination was not determined during the USAEHA investigation.

During the SIA, the radial extent of contamination was not evaluated because the details of the USAEHA report were not available to Arthur D. Little until after the field sampling was completed. The locations of the soil samples collected during the SIA were based upon visual inspection of soil staining and proximity to transformers and storage. A site "walk over" was conducted of the shed storage yards; however, no indications of PCB contamination staining were noted. PCB contamination is not likely to be an issue in the northeastern portion of the property where transformers are stored.

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4.4.2 Ground Water

Six ground water samples were collected and analyzed for VOCs, SVOCs, and total and dissolved metals.

Field Parameters: During the sampling process, field measurements were made of the ground water for pH, conductivity, temperature, and turbidity. The field parameters are indicative of general water quality and are included on Table 4-4.

Field parameter data are obtained, for ground water sampling, to ensure that the samples are representative of the aquifer. Field parameters are also collected for surface water and leachate. Although there are no established values for comparison with the field parameter, ranges are available for the ground water which can be used as general guidelines:

- pH normally ranges from 6 to 8.5 in natural ground waters. More acidic water
 may exist in the presence of some metal reactions (i.e., oxidation of sulfides)
 (Hem, 1985).
- Conductivity can range from 0.5 umho/cm² in very pure water to 6,000 umho/cm² in ground water with a high chloride, sulfate, or carbon concentrations (Hem, 1985).
- Temperature varies with season, depth to water, and recharge conditions. Ground water generally is 1 to 2°C higher than the local mean temperature. Based on nationwide climate data, ground water in Maryland should be in the range of 10 to 15°C (Todd, 1980). However, ground water was often slightly cooler, probably because the samples were collected during the winter and the depth of water was shallow.
- Turbidity has a wide range depending upon the amount of silt or fine material in the ground water. At FGGM, the ground water ranged from below to above instrument detection (reported as '>999'). Given the range in sample clearness, this range appears acceptable.

For ground water samples from the lower Patapsco aquifer, pH ranged from 4.21 to 4.85. Conductivity ranged from 0.181 to 0.778 µmhos/cm². Temperature ranged from 9.8°C to 12.7°C. Turbidity ranged from below detection to greater than 999 NTUs. None of the measurements was for outside of the expected range; no trends were observed.

Volatile Organic Compounds: Volatile organic compounds (VOCs) have many applications ranging from cleaning and degreasing solvents to refrigerants, fumigants, propellants, and adhesives. These compounds can also be used as a component of

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synthetic fibers and in fire extinguishers (Sax and Lewis, 1987). These compounds are frequently used in both domestic and industrial products and, over time, they can be degraded, allowing for a wide range of VOCs to be present. Because industrial and household items are stored at the DSY and due to the presence of VOCs in past sampling rounds, six ground water samples were collected and analyzed for 41 VOCs. A total of six VOCs were detected and are summarized on Table 4-5 along with their respective MCLs.

All of the VOCs detected in ground water were halogenated organics, typically used as solvents, refrigerants, and in fire extinguishers. The specific VOCs identified include primary halogenated ethanes and ethenes [PCE, 1,1,1-trichloroethene (TCA), 1,1-dichloroethene (1,1-DCE)] trichloroflouromethane (known as Freon-11), carbon tetrachloride, and chloroform. Figure 4-4 illustrates the concentrations and distribution of the detected VOCs. The representative chemical classes of the VOCs identified during the SIA and their distribution are analogous to the results of the SI (EA Engineering, Science and Technology, 1992b). The following observations can be made after comparing the 1993 data and the 1991 data:

- VOC contamination was not present above the detection limits at the deep on-site well (MW-43D) in either study.
- The highest concentration of VOCs are located in the southwest corner (MW-200 and MW-42).
- During the 1993 SIA, PCE, TCA, DCE, and Freon 11 were detected in samples from MW-42. Only PCE and TCA were detected previously. PCE exceeds the MCL in both samples, however its concentration has decreased slightly since the 1991 SI. The TCA concentration has increased slightly since the 1991 SI but its concentration continues to be below the MCL. During the 1993 SIA, DCE exceeded the MCL criteria.
- During the 1993 SIA, carbon tetrachloride and PCE were detected at MW-43S; these compounds were not previously reported at this location. Neither of these compounds exceeded their MCL.

In general, comparison of the data from the two investigations reveals an overall increase in total VOCs. Of the existing wells, little change was observed in the analytical data.

The highest total VOC concentration measured during the SIA was greater than 180 μ g/L detected at MW-200; however, MW-200 was installed during the SIA, thus no previous information is available at this location. The next highest total VOC concentration was 101 μ g/L detected at MW-42, which was the location of the

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highest VOC concentration during the SI (72 μ g/L). Table 4-5 provides a summary of the VOCs found in ground water and Figure 4-4 illustrates the locations of each individual VOC. VOCs were not detected at either COE-1 or MW-43D during the SIA or the SI.

Two compounds were present at concentrations that exceeded their MCLs. PCE was present above its MCL in two locations (MW-42 and MW-200) and 1,1-DCE at one location (MW-42). Both MW-42 and MW-200 are located along the southern fence, which is believed to be upgradient of the property. The maximum concentrations for the two compounds in excess of MCLs are shown below.

Ma	ximum Conc	entrations, μ	g/L
voc	1991 SI	1993 SIA	MCL
1,1-DCE	ND	12	7 μg/l
PCE	50.90	>150	5 μg/L

As illustrated by the table above, the maximum PCE and 1,1-DCE concentrations detected during the SIA are higher than the concentrations detected during SI.

Semivolatile Organic Compounds: Semivolatile organic compounds (SVOCs) are used in a variety of compounds including pesticides, tars, oils, and other petroleum products. Because a variety of materials are stored at the DSY, six ground water samples were analyzed for 116 SVOCs, of which one was detected (Table 4-5). Figure 4-4 illustrates the distribution of SVOCs at the DSY.

Low concentrations of bromacil, a pesticide, were detected in MW-43S and MW-201. There are no regulatory limits in ground water for this compound. No other SVOCs were detected.

Metals: Metals are naturally occurring elements that are frequently used to construct a wide variety of industrial and household goods. Metals are also commonly used in paints and pigments. Because of the large amount of scrap metal, inert bombs, and equipment stored at the DSY, the potential for significantly elevated metals concentrations exists. Therefore, ground water samples were analyzed for 27 metals, both total and dissolved (filtered). Nine metals were not detected in any of the samples: antimony, cadmium, molybdenum, nickel, selenium, silver, tellurium, thallium, and tin. Metals that were detected are summarized on Table 4-4 along with their respective MCLs. The distribution of the two metals exceeding the MCL or action level, lead and chromium, is illustrated in Figure 4-5.

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Metals were detected at every sampling location; however, the highest total concentrations were observed in the wells located along the southern boundary.

Total chromium exceeded its primary MCL and total lead exceeded its action level. Chromium MCL exceedences and near exceedences for lead action levels were reported in samples from the shallow, southern boundary wells installed during the SI. No metals MCL or action level exceedences were reported in the monitoring wells installed during the 1993 SIA. The method detection limit for antimony (60 µg/L), thallium (125 µg/L), and cadmium (6.78 µg/L) are above MCLs (6 µg/L, 2 µg/L, and 5 µg/L, respectively) and therefore some of the nondetect results for these compounds may exceed the MCL. The MCLs for aluminum and manganese were exceeded by total and dissolved metal concentrations at all wells except at MW-200 and MW-43D. At MW-34D, the MCL for aluminum was exceeded in the total metals only. The MCL for iron was exceeded by total metals in every shallow well and it was nearly exceeded in the dissolved metals for COE-1.

Nearly all of the MCL exceedences were for total metals; however, the concentration of dissolved chromium measured at MW-42 (98.1 μ g/L) is just under the MCL (100 μ g/L).

The chemical data were also compared to the previous sampling results to determine if the concentrations were within the previous range. In total, 20 concentrations exceeded their previous maximum (three were measured in the new wells) and 16 concentrations fell below their previous minimum. Significant increases in chromium (MW-42 and MW-43S) and mercury (MW-43) were observed.

As discussed in Section 4.3.3, the ground water flow direction and the source locations are not well understood; therefore, no well is currently identified as representing upgradient or background water chemistry. Without an unimpacted well for determining background metals concentrations, it is difficult to determine which metals are present at elevated concentrations.

4.5 Contaminant Assessment

During the 1993 SIA, the primary contaminants of concern identified in ground water at the DSY were halogenated VOCs, lead, and chromium. These compounds were identified during the 1991 SI and continue to be detected in the shallow monitoring wells located along the southern boundary of the property. Two additional VOCs, trichlorofluoromethane and carbon tetrachloride, were detected for the first time in samples collected during the SIA.

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Excluding MW-200 as a data point, ground water appears to flow to the north. The extent of contamination and the source of contamination are not known. It appears that the source is most likely located along the DSY's southern boundary or is off site. The downgradient edges of the plume, as well as the source, have not been clearly defined; however, VOC contamination significantly decreases to the east and northeast. The absence of VOC contamination at MW-43D indicates that the contamination has attenuated with depth. If MW-200 is not excluded as a data point, it is possible that the contaminant source exists in or at the edge of the DSY.

The implications of the new data are:

- The source of VOC contamination in still unknown.
- The source is continuing to discharge contamination into ground water and maximum total VOC concentrations may be increasing.
- The upgradient and downgradient edges of the VOC plume are not known.
- The direction of ground water is not understood with a significant degree of confidence.
- If the water level in MW-200 is representative, ground water may be flowing from underneath the DSY toward MW-200. The highest concentration of total VOCs was found in this well, supporting this theory.

4.6 Data Gaps and Recommendations

The primary objectives of the SIA at the DSY were to (1) confirm the presence or absence of previously detected ground water contamination, (2) provide further information about the location source of the contamination, and (3) establish with certainty the flow direction for ground water because of this site's close proximity to the BRAC parcel. During the SIA, the presence of VOC contamination was confirmed and additional data gaps were identified. The most notable data gaps relate to ground water flow direction and source location.

The reasons for the importance of the anomalies discovered at MW-200 are multifold. First, the direction of ground water flow cannot be determined with any degree of certainty. If MW-200 is excluded in the ground water contour map, the ground water flow direction is northward; otherwise the flow may be southward. It is possible that the water levels along Route 32 may be influenced by hydraulic conductivities, seasonal fluctuations, or surface water drainage from the highway, but no data currently exist to evaluate their influences.

Due to the uncertainty of the direction of ground water flow and the high concentration of VOCs detected at MW-200, it is unclear exactly which direction is

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downgradient. If the ground water is flowing southward, it is possible that contamination from the DSY is flowing onto the BRAC parcel.

The source and extent of VOC contamination is unknown at present. Further investigation is necessary to resolve the potential issues described above. The following are proposed actions and rationales suggested to address the data gaps identified during the SIA. The USAEC is conducting a RI at the DSY which will include a detailed evaluation of site conditions. Work plans for that effort are expected to be released in May 1995 and detail the sampling and analysis program for the site.

	Data Gap	Proposed Action	Rationale
1.	The hydraulic conductivity of the screened materials at MW-200 is unknown and may have an effect on relative water levels.	Conduct hydraulic conductivity tests in new wells and existing wells: MW-42, MW-43D, and MW-43S.	Differences in hydraulic conductivity may affect flow and therefore be the cause of the unusual water level measurement.
2.	The drainage patterns along Route 32 may result in ground water mounding at MW-42 and MW-43; if mounding exists, it may be responsible for the unexplained water levels along Route 32.	 Install recording devices in MW-200 and MW-42 and monitor water levels weekly for one year. Collect precipitation data for comparison to the water levels. 	Comparison of the water levels against each other and against precipitation data will indicate if the water levels stay constant relative to each other or if they are influenced by infiltration due to surface drainage; if drainage patterns are affecting the water levels, it may mean that the ground water flow direction at the DSY is not to the north but may be flowing onto the BRAC parcel.
3.	The effect of seasonal fluctuations on ground water flow directions is unknown.	Collect water level measurements quarterly in all on-site wells plus six wells at inactive landfill #4 for a one- year period.	 Quarterly data can be used to determine if seasonal fluctuations are occurring; the additional wells will provide data on a larger scale base area. The recording data collected for data gap #2 will also be evaluated regarding potential seasonal changes.

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	Data Gap	Proposed Action	Rationale
4.	Depending upon the ground water flow direction, the area south of Route 32 may be either up or downgradient of the source; if ground water flow is northward, than the source area may be located south of the site; if ground water flow is southward, then contamination may be flowing from the DSY to the BRAC parcel.	 Advance a maximum of seven borings south and east of Route 32; locations will depend upon field screening readings. Collect ground water samples during drilling and screen for VOCs on-site. Conduct VOC screening of selected soils with elevated PID headspace readings. A maximum of three monitoring wells will be installed; their locations will be based on the field screening, however, one well will be located approximately south of MW-200 for water level readings. 	 Field screening data will be used to locate the extent of the plume to the south (assuming southern flow) or to help identify the source (assuming northern flow). The ground water field screening provides timely data for evaluation of (a) whether a well should be installed, and (b) locations for the remaining borings; the field screening data are necessary to direct the field program and to limit the necessary number of permanent wells. The soil screening will help identify potential source materials. The well located south of MW-200 is needed to evaluate water levels in the vicinity of MW-200.
5.	The extent of ground water contamination west of MW-200 is unknown; currently, the westernmost sampling point has the highest concentrations of VOCs.	 Install one monitoring well west of MW-200. Collect water level data and ground water samples. 	 The water level data are needed to evaluate the ground water contours in the vicinity of MW-200. The chemical data are needed to evaluate the extent of the plume west of MW-200.
6.	The extent of ground water contamination north of the DSY is unknown.	 Install a monitoring well north of MW-200 and west of MW-201. Advance a maximum of three borings north of the DSY along Rock Avenue; one of the borings will be installed as a monitoring well dependent on the results of ground water samples analyzed on site. 	 The monitoring well located west of MW-201 is needed to evaluate the western extent of the plume and to help clarify water levels in the vicinity of MW-200. The three northern borings are intended to identify the northern boundary of the ground water contamination; the well will provide chemical and water level data and will be a replacement for the piezometers DH-3-OW and DH-1-OW that could not be sampled.
7.	The plume is not well delineated and has not been evaluated seasonally.	 Collect quarterly samples from new and existing DSY wells for one year. Analyze all samples for VOCs and metals; new wells will be sampled for SVOCs during the first round but, assuming no SVOC contamination is detected, will only be sampled for VOCs and metals in subsequent rounds. 	 Data from the existing wells are necessary to confirm the previous results; data are needed from both the new and existing wells to define the extent of the contamination. A full year of data is necessary for evaluating trends and seasonal fluctuations.

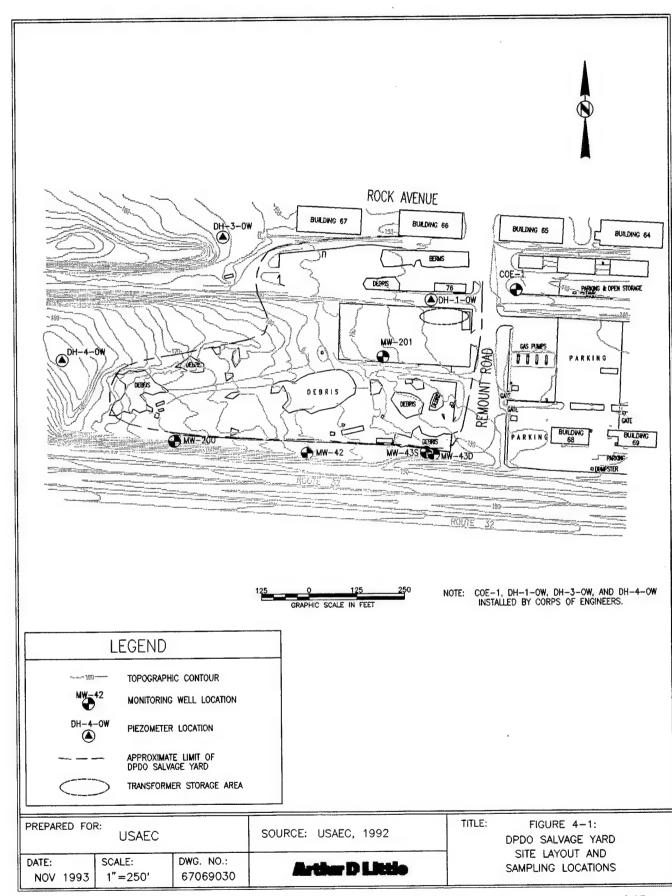
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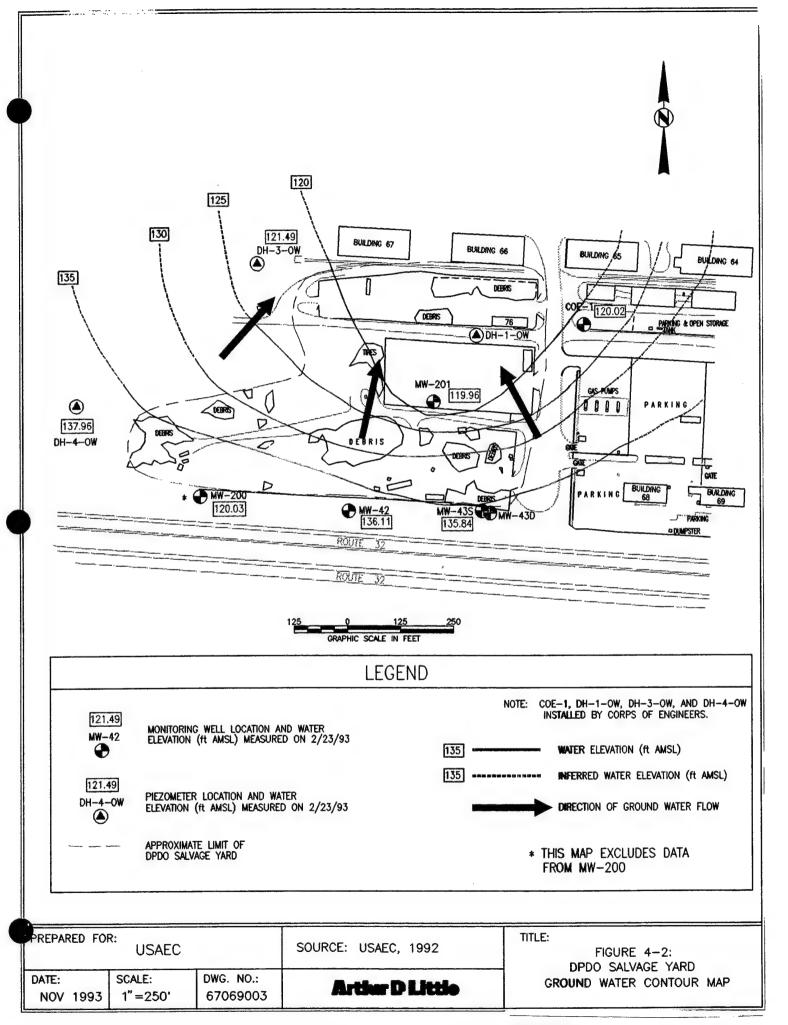
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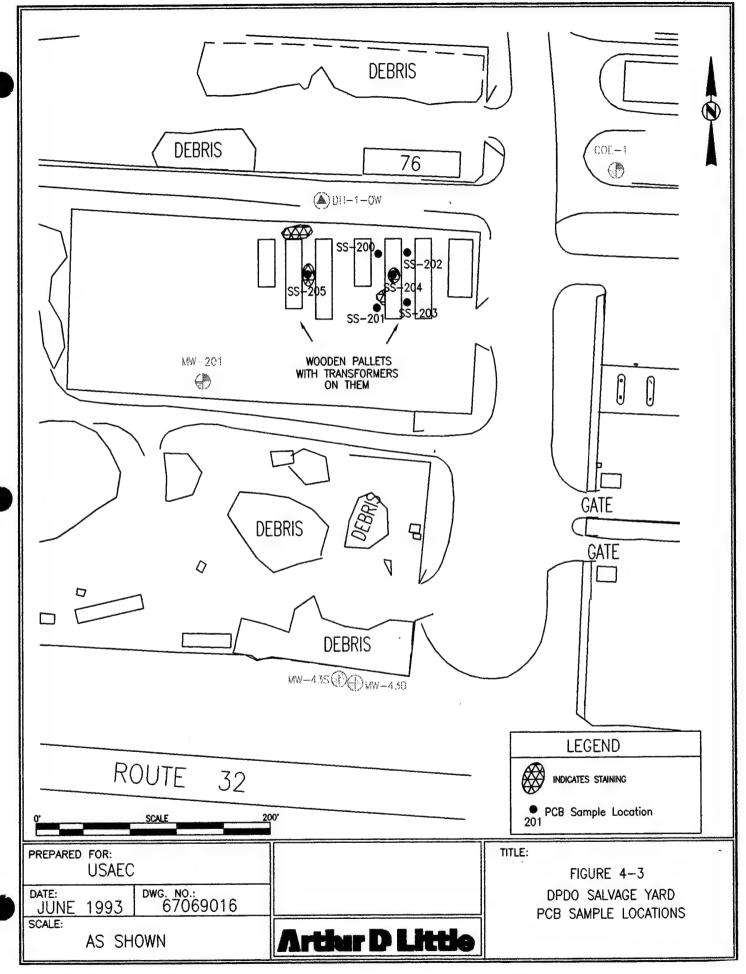
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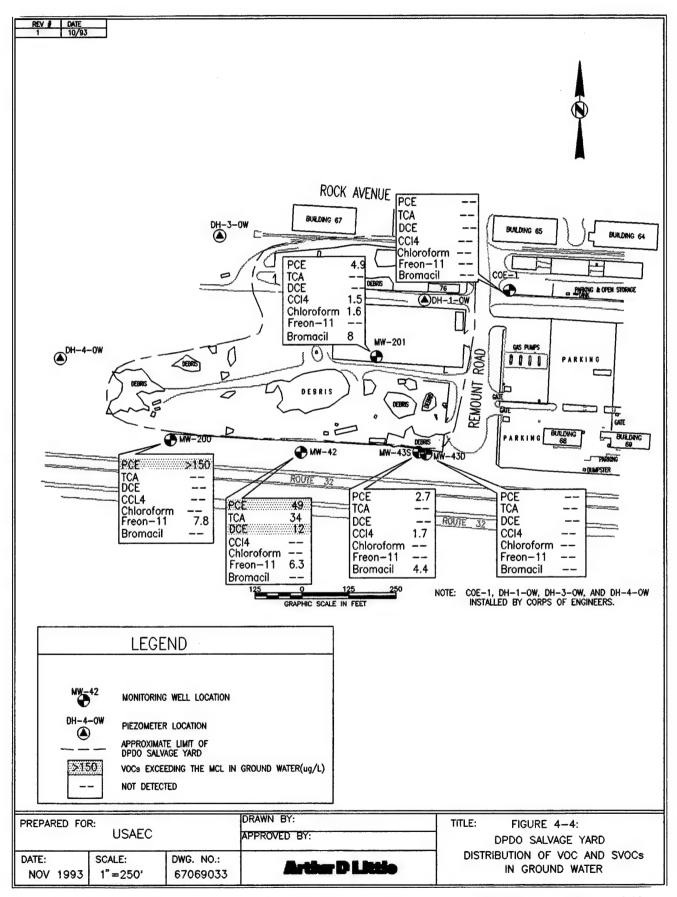
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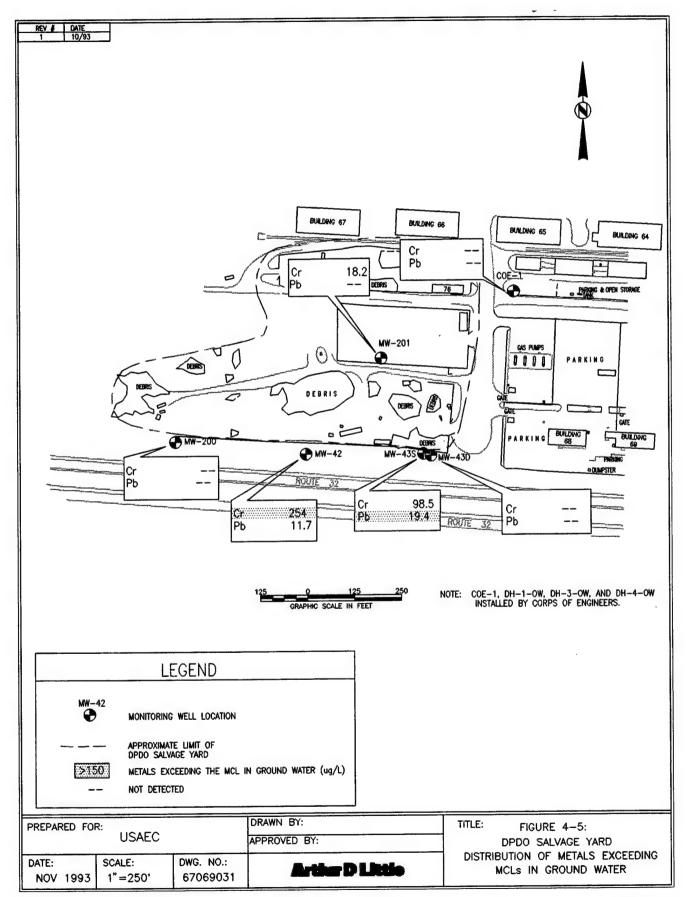
	Data Gap	Proposed Action	Rationale
3	XO may be present in the absurface.	Conduct UXO clearance for all new sampling points.	UXO present a safety concern that requires both downhole and surface clearances.
ne	ocation/elevation data are seded for interpretation of ydrologic conditions.	Survey in the new wells.	Location information is needed for data entry into IRDMIS. Elevation data are needed for construction of ground water contour maps.
ma	record of decision (ROD) ay be needed for site completion.	 Conduct ecological and human health risk assessments (additional surficial soil data may be required to complete). Complete a feasibility study and a proposed plan. 	Additional items are required for a ROD.











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Table 4-1: Ground Water Elevation Data for the DPDO Salvage Yard and Transformer Storage Area

		Date: 2	/23/93
Site ID	MP Elevation ft MSL	DTW ft	Elevation ft MSL
COE-1	146.42	26.40	120.02
MW-42	178.26	42.15	136.11
MW-43S	171.34	35.50	135.84
MW-43D	171.72	36.10	135.62
MW-200	170.38	50.35	120.03
MW-201	151.60	31.39	119.96
DH-3-OW	157.14	35.65	121.49
DH-04-0W	200.34	62.38	137.96

Notes:

MSL - mean sea level

MP - measuring point (notched or marked PVC) unless noted otherwise

DTW - depth-to-water from the measuring point

Table 4-2 Summary of Laboratory Samples for the DPDO Salvage Yard and Transformer Storage Area - As Collected (Page 1 of 2) Fort George G. Meade, Site Inspection Addendum

												•	TCLP						
TYPE OF SAMPLE	SITE ID	FIELD	DATE	SITE TYPE	MEDIA	¥€	DEPT	TCL	57 00 00	PHC F	TAL FMET (TAL	ORG/ MET PC	PCB E	EXP CI		NO3 TDS	SO4 PES	PEST
SOIL INVESTIGATION	NO																		
Background	BKG-16	B1A0016	020233	AHOL	8	z	23 FT	0	0	0	0	-	0	0	0	0	0	0	-
Soils	BKG-17 BKG-18	B1A0017 B1A0018	020293	A A	88	zz	23FT 23FT	00	00	00	00		00	00	00	00	00	00	
	BKG-22	B1A0022	011894	AHOL	8	z	2:3 FT	0	0	0	0	-	0		0	0	0	0	-
	BKG-23	B1A0023	011894	AHOL	8	z	2-3FT	0	0	0	0	-	0	0	•	0	0	•	-
Soil Samples	SS-200	D1A0200A	020293	AHOL	8	z	Ni 9-0	0	0	0	0	0	0	_	0	0	0	0	0
	SS-201	D1A0201A	020293	AHOL	8	z	0-6 fN	0	0	0	0	0	0	_	0	0	0	0	0
	SS-202	D1A0202A	020293	AHOL V	8	z	N 9-0	0	0	0	0	0	0	_		0	0	0	0
	SS-203	D1A0203A	020333	AHOL	8	z	0-6 IN	0	0	0	0	0	0	_	0	0	0	0	0
	SS-204	D1A0204A	020333	AHOL	8	z	N 9-0	0	0	0	0	0	0	-			0	0	0
	SS-205	D1A0205A	020333	AHO,	8	z	0-6 IN	0	0	0	0	0	0	-			0	0	0
Collocates	93QC-400 Q1A (dup of SS-200)	93QC-400 Q1AD400 (dup of SS-200)	020283	AHOL.	88	z	N 9-0	0	0	0	0	0	0	-	0	• .	•	0	0
Field Blanks	93QC-100	93QC-103 Q1XF103	020293	FBLK	CSW	z	0	0	0	0	0	0	0	-	0	0	0	0	0
Rinse Bianks	93QC-10	93QC-104 Q1XR203	020393	RINSW	CSW	z	0	0	0	0	0	0	0	-	0	0	0	0	0

Table 4-2 Summary of Laboratory Samples for the DPDO Salvage Yard and Transformer Storage Area - As Collected (Page 2 of 2) Fort George G. Meade, Site Inspection Addendum

WELL CGW E UP 1 0 1 1 0 </th
CGW E UP 1 1 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
CGW E UP 1 1 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
CGW R C UP 1 1 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
CGW N UP 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
CGW N UP 1 1 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
CSW
CSW N 0 1 1 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0
CSW N 0 1 1 0 1 1 0 0 0 0 0 0 0 0

NOTES:

IRDMIS Site Type Codes: WELL=water, AHOL=auger hole (1) indicates if sample location is new (N) or existing (E)

IRDMIS Media Codes: CGW-chemical ground water, CSO-chemical soil FBLK-field blank, RNSW-rinse water

Depths for ground water samples: UP=upper Patapsoo, LP=lower Patapsoo, PX=Patuxent, ND=not determined or unclear CSW-chemical surface water

NA - not applicable Shading indicates changes from the original SOW

TCL, VDCs - Votalle Organics, Target Compound List TCL, SVCCs - Semivotatie Organics, Target Compound List PHC - Petroleum hydrocarbons

TAL FMET - Filtered metals, Target Analyte List TAL UMET - Unfiltered metals, Target Analyte List

ORG/MET - organics/metals EXP - Explosives

NC - not collected (explained in text) TDS - Total Dissolved Solids

PEST - Pesticides

Table 4-3: PCBs in Surficial Soil at the DPDO Salvage Yard and Transformer Storage Area Page 1 of 1

Sample Location Identification Fleid Sample ID Start Depth (ft bgs) End Depth (ft bgs) Media Collection Date QC Type	SS-200 D1A0200Y 0 0 0.5 CSO 02-Feb-83	830C-400 O1AD400Y 0.5 0.5 02-Feb-93 Dup. of SS-200	85-201 D1A0201 Y 0 0 0.5 CS0 02-Feb-93	SS-202 D1A0202Y 0 0 0.5 CSO 02-Feb-93	SS-203 D1A0203 y 0 0 0 0 SSC CSC 03-Feb-93	SS-204 D1A0204Y 0 0 0.5 CSO 03-Feb-93	SS-206 D1AG206Y 0 0.5 CSO 03-F-eb-83
PCBs (ug/g)							
PCB 1260	0.314	0.271	4	0.752	0.599	83.	1
TOTAL PCBs	0.3	0.3	4	0.8	0.6	8	•

Notes: Dashes indicate that the analyte is present below detection limit Only detected analytes are included on this table, for full data set see appropriate appendix

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TABLE 4-4: Field Screening and Metais Data for Ground Water from the DPDO Salvage Yard and Transformer Storage Area Page 1 of 2

Field Sample ID She Type Screen Start Depth (# bgs) Screen End Depth (# bgs)			DIMODULY WELL 24.55	PAISE WELL PAISE P	DIMONATY WELL 35	DIMIOGEZ WELL 35 35 46	OTXOGEN WELL 35	OTXD45ZZ WELL WELL SS	MW43D DIW043DY WELL B2 B2 B2	MW43D DIMO43DZ WELL R2 82 82
Total Disserving Collection Date OCType			Total 23-Feb-93	Devlocal Zafeb-63	Total 24-Feb-93	Dissorted 24-Fab-53	Total Dia 24Fab-33 244 Duplicate of MW-42	00000 - 20K 1 R0000000	Total 24#ab-93	Dissolved 24-Feb-63
FIELD PARAMETERS										
pH Conductivity(umhos/cm2)			4.33		4.85				4.72	
Temperature(C) Turbidity(NTU)			12.7		12.1				9.8	
METALS (ug/L)	MCL	SMCL/MCLG								
Aluminum	:	50-200 S	2,240	136	12,300	197	26,900	191	249	ı
Arsenic	8	:	:	1	4.35	1	7.78	1	ı	1
Barium	2,000	5	35	83.4	193	\$	255	101	823	216
Beryllium	4	5	1	1	;	1	12	1	1	ı
Boron	;	:	:	1	457	410	200	354	ı	ı
Calcium	:	1	12,300	11,900	28,200	27,100	28,500	22,900	32,700	30,000
Chromium	8	5	t	:	254	28.	* 446	91.6	1	19.1
Copper	1,300		21.8	:	56.5	:	97.4	1	ı	ı
lon	: !	300 S	9,130	798	34,800	66.6	25,800	:	883	84.4
Pead	5	*	1	1	11.7	1	15.1	1	1	:
Wagnesium	: :	رب ج : ج	0,040	090,4 0 8 0.8	12,100	10,900	13,100	10,100 52	7,690	6,920
Mercury	8		,	;		1	0.128	! ;	1	1
Potassium	:	:	3,410	2,570	5,620	4,030	6,910	3290	15,200	13,900
Sodium	:	:	17,600	19,400	10,100	9,850	068'6	8,460	75,000	71,000
Vanadium	:	:	:	•	65.6	ı	114	1	i	1
Zinc	:	S 000'S	67.5	71.4	127	105	52	80.8	38.3	28.7
TOTAL HEAVY METALS			•	0	2,2	8	368	8	0	19
TOTAL METALS			48,963	38,598	104,447	53,025	142,741	45,690	131,497	122,233

NOTES:

Only detected analytes are included on this table, for full data set see the appropriate appendix Pluses (+) indicate that the screen interval based on total depth measurements assuming a 10-toot screen and a 2.5-ft stickup (well construction information unavailable)

Asteriska (*) indicate enalytes present above primary standards (e.g., MCL, maximum AWCC)

MCL - maximum contaminant level, MCLG (G) - MCL goal, SMCL (S) - secondary MCL
Dashes (--) indicate that no standard (e.g., MCL, SMCL, MCLG) exists or that the analyte is present below detection limits

Action levels for lead and copper are listed under MCLs Heavy metals include Sb,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag

TABLE 4-4: Field Screening and Metals Data for Ground Water from the DPDO Salvage Yard and Transformer Storage Area Page 2 of 2

Sample Location identification Fluid Sample ID Site Type Screen Start Depth (it bgs) Screen End Depth (it bgs) Made Collection Date Octored			DIMOSSY WELL 30 30 COW Total 24-Fat-93	MW438 DIMOGSZ WELL SS COW COW Disserved	MW.200 DIMOZOOV WELL 47 67 CSW Total	MW-200 DIMOZOOZ WELL 47 E7 CAW Dissaction Zaff-sh-53	MW-201 DIMOZOTY WELL 28 28 COW Total	MW-201 MELL MELL CGW Disserted 18-Mar-43
FIELD PARAMETERS								
pH Conductivity(umbos/cm2)			4.21		4.46		4.68	
Temperature(C) Turbidity(NTU)			11.7		11.9		12 >999	
METALS (ug/L)	MCL :	SMCL/MCLG						
Aluminum	1	50-200 S	18,100	1,480	1,430	;	5,810	139
Arsenic	28		8.29			1	3.98	1
Barium	2,000	5	57	901	107	501	110	49.4
Beryllium	4	5	1.45	1	:	1	1	ı
Boron	1	:	1	367	267	296	1	1
Calcium	ı	:	26,000	25,500	19,100	25,100	12,700	12,900
Chromium	8		98.5	:	;	1	18.2	1
Copper	,300		89.5	1 8	37.4	: 5	1 00	1
uo.	ı f	900	007,76	8	3,530	8 1 8 1	010,6	1 1
Magnesium	2 :	:	11.900	11.300	5.180	5.710	7.050	6.910
Manganese	1	s 06	310	230	112	\$	158	134
Marcury	2	5	0.859	ı	•	1	1	ı
Potassium	1	:	5,140	3,780	5,700	6,550	4,290	3,530
Sodium	:	:	000'26	000'06	8,560	9,710	19,600	20,100
Vanadium	;	:	116	1	;	1	1	t
Zinc	1	2,000 S	288	316	39.7	412	286	186
TOTAL HEAVY METALS			128	0	0	0	8	0
TOTAL METALS			216,455	133,299	44,063	47,734	55,036	43,948

NOTES:

Only detected analyses are included on this table, for full data set see the appropriate appendix.
Pluses (+) indicate that the screen interval based on total depth measurements assuming a 10-foot screen and a 2.5-ft stickup (well construction information unavailable)

Asterisks (*) indicate analytes present above primary standards (e.g., MCL, maximum AWCC)
MCL - maximum contaminant level, MCLG (G) - MCL goal, SMCL (S) - secondary MCL
Dashes (-) indicate that no standard (e.g., MCL, SMCL, MCLG) exists or that the analyte is present below detection limits
Action levels for lead and copper are listed under MCLs
Heavy metals include Sb,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag

TABLE 4-5: Organic Compounds in Ground Water from the DPDO Salvage Yard and Transformer Storage Area Page 1 of 1

Field Sample ID Ster Type Screen Start Depth (ft bgs) Screen End Depth (ft bgs) Madia Collection Date		DiMOON WELL 24.5; 34.5; CGW 23.54b-93	DYMOO42 WELL 35 CGW 24-feb-93	Orkbess Well. 38 45 COW 24Feb-83 Dup of MW42	DIMOGRAD WELL 82 92 CSW 24Feb-93	DIMOSTS WELL 30 40 CGW 24Fab-83	DIMOSON WELL 41 57 57 75 75 75 75 75 75 75 75 75 75 75	Driwozer WELL 26 36 CSW 18-Mar/93
VOLATILE ORGANIC COMPOUNDS (ug/L)	SMCL/ MCL MCLG							
HALOGENATED ORGANICS 1,1-Dichloroethene	7	ı	12	÷	:	!	1	;
Chlorotorm 1,1,1-Trichloroethane	100 200 0 G	: :	፥ ສ	: 8	1 1	1 1 7	۰ 8	6. 1
Tetrachloroethene	•	: :	÷ 64	* 94	1 1	2.7	± 150 GT +	c. 4.
OTHER Trichloroffuoromethane	:	1	6.9	60	ı	ı	7.8	ı
TENTATIVELY IDENTIFIED COMPOUNDS (TICs) Total Number of TICs		0	•	0	0	-	•	•
Total Concentration of TICs	:	:	ŧ	:	;	4	ı	1
TOTAL VOCs		0	101	88	0	60	180	€
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)								
Bromacil	1	ě	1	1	1	4.4	t	8
TENTATIVELY IDENTIFIED COMPOUNDS (TICs) Total Number of TICs Total Concentration of TICs	:	0:	0 ;	0 1	0:	01	0 1	
TOTAL SVOCs		•	-	c	•	•	•	Ą

Only detected analytes are induded on this table, for full data set see the appropriate appendix
Pluses (+) indicate that the screen interval based on total depth measurements assuming a 10-foot screen and a 2.5-ft stickup (well construction information unavailable)
Asterisks (*) indicate analytes present above primary standards (i.e., MCLs, Maximum AWQC)
MCL - maximum contaminant level, MCLG (G) - MCL goal, SMCL (S) - secondary MCL

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5.0 Physical Characterization and Contaminant Assessment of the Fire Training Area (FTA)

5.1 Introduction and Background

The FTA is located on Airfield Road, north of Tipton Airfield in the area to be excessed (Figures 1-2 and 5-1). This area was constructed in 1979 and is still in use for fire training by the Fort Meade Fire Department. The fires are set using aviation fuel or gasoline and extinguished with either water or aqueous firm forming foam (AFFF). AFFF is primarily comprised of pressurized biological proteins.

A limited SI was conducted at the FTA in 1990 (EA Engineering, Science and Technology, 1992). The results of that investigation are summarized below, however, for a detailed description of the study refer to that document.

During the SI, a soil gas survey, using 28 soil vapor points, was conducted and six subsurface soil samples were collected. The soil gas samples were collected at a depth of 3 feet due to the shallow depth to ground water and relatively low permeability of the soil at depths greater than 3 feet. The soil samples were collected between 4 to 6 feet, below the depth at which the water table was encountered.

The soil gas survey results were inconclusive because of the soil's low permeability. A soil gas sample from one location (VP-6) had 2,000 ppm total hydrocarbon and 0.01 ppm PCE. Benzene (0.037 μ g/g), bis(2-ethylhexyl)phthalate (4.16 μ g/g), and 2-methylnapthalene (0.13 μ g/g) were reported in soil samples FT-1, FT-2, and FT-3, respectively. EA concluded that the metals concentrations were within the average range for metals expected to be measured in Anne Arundel County.

5.2 Summary of Investigation for Study Area

The objective of the SIA field investigation at the FTA was to determine if activities in this area have resulted in ground water contamination. The tasks conducted to achieve this objective included:

- Completion of a down-hole UXO surveys
- Installation of three water monitoring wells in the water table aquifer
- Collection and analysis of three ground water samples
- Collection and analysis of one sludge sample from the oil-water separator

During the field operations, several changes were made. Each of the changes was based on discussions with and approved by the USAEC geologist and/or COR:

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 The monitoring well installation deviated from the Geotechnical Requirements (USATHAMA, 1987) because the water table was encountered at a shallower depth than the minimum depths described in these requirements.

 Ground water samples were analyzed for the presence of total petroleum hydrocarbons.

Three shallow monitoring wells were installed with their screened intervals intersecting the water table. The wells were placed based upon observations made during the field operations and previous site visit. The three well locations were selected to represent upgradient and downgradient locations. All of the wells were installed to evaluate the potential impact on ground water resulting from fire fighting training activities and to determine the direction of ground water flow. FTAMW-1 was installed along the southern boundary of the property and FTAMW-2 and FTAMW-3 were installed along the northern boundary of the property (Figure 5-1).

Due to the shallow water table, approval was given to deviate from Geotechnical Requirements with respect to the monitoring well installation. The Geotechnical Requirements assume that the depth to water is a minimum of 18 feet. The screened intervals for the three monitoring wells required more shallow placement to ensure that the top of the water table was intersected. It is critical that the screen be placed as such so that any floating non-aqueous phase liquid (NAPL), if present, would be detected. In all three wells the sand pack filter was 1 foot above the screened interval and the bentonite seal was 1 foot thick.

Ground water samples were collected from each well at the FTA and analyzed for VOCs, SVOCs, total petroleum hydrocarbons (TPHC), and total and dissolved metals. Approval was granted to collect additional samples for TPHC analysis based upon the historical use of this parcel and reported fuel odors during previous investigations.

5.3 Physical Characterization of the Study Area

5.3.1 General Description

The facility includes a 20-foot diameter concrete pad surrounded by a 1-foot concrete berm. Several other structures, including a small building for enclosed fire fighting, are used for fire training. There is a subsurface sump, which appears to be an oil-water separator, adjacent to the concrete fire training area. The sump presumably collects water from the training area, however, its function and connection have not been confirmed. Other objects found within the fenced area include two abandoned cars, an abandoned helicopter, a storage tank (not in use), several storage trailers, and a pile of soil covered with clear plastic. A culvert is located in the southwest corner, outside the fence. The origin of this culvert is not understood.

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5.3.2 Geology

Geotechnical samples were collected from soil borings up to a total depth of 16.5 feet. The soil is poorly sorted medium-grained sand grading downward into a fine-grained sand with silt. The sand's color varied slightly with depth; there were no significant changes observed in the silt's color or texture.

The soil observed at the FTA is representative of the lower Patapsco Formation. The location of the FTA at FGGM further supports that the wells are placed in the lower Patapsco Formation.

5.3.3 Hydrogeology

The unconfined, lower Patapsco aquifer acts as the water table aquifer at the FTA. The hydrogeologic field investigation included the installation of three monitoring wells and collection of ground water samples.

A complete round of depth-to-water measurements was collected February 18, 1993. The measurements are reported along with corresponding water level elevations on Table 5-1. Ground water levels ranged from 115.76 to 116.34 feet MSL. The ground water flow is to the west, as illustrated in Figure 5-2.

The wells with maximum and minimum water levels are approximately 100 feet apart. The average ground water gradient across the site is 6 x 10⁻³ ft/ft. Because this is a very shallow gradient, it may be susceptible to seasonal variation, thus the direction of ground water flow cannot be concluded with accuracy.

5.4 Nature and Extent of Contamination

During the SIA field investigation ground water samples were collected to evaluate the nature and extent of contamination. The results of these sampling efforts are described below. The data tables presented in this section provide a summary of the detected analytes. A complete summary of the data for each sample can be found in Appendix I. Table 5-2 provides a complete summary of the laboratory samples collected at the FTA, including site IDs, site types, media codes, and analytical parameters. All sampling locations are illustrated on Figure 5-1.

5.4.1 Ground Water

Three ground water samples were collected and analyzed for VOCs, SVOCs, TPHCs, and total and dissolved metals.

Field Parameters: During the sampling process, field measurements were made of the ground water for pH, conductivity, temperature, and turbidity. The field parameters are indicative of the general water quality, and are found in Table 5-3.

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For ground water samples from the lower Patapsco aquifer, pH ranged from 5.06 to 7.43. Conductivity ranged from 0.100 to 0.127 µmhos/cm². Temperature ranged from 6.3°C to 8.8°C. The range for turbidity was from 8 to greater than 999 NTUs. None of the measurements was outside the expected range; no trends were observable.

Volatile Organic Compounds: The VOCs expected to be encountered at the FTA would include primarily VOCs used in fire extinguishers and aromatics; and petroleum-related compounds from the fuel used for the practice fires. Ground water was analyzed for 41 VOCs, of which one known compound was detected — carbon tetrachloride. Table 5-4 includes the concentration of the VOC detected along with its respective MCL.

The VOCs detected included carbon tetrachloride and unknown VOCs. Carbon tetrachloride was detected in downgradient well FTAMW-3 at 35 μ g/L, which exceeds its MCL of 5 μ g/L. Figure 5-3 illustrates the distributions of VOCs at this property.

The highest concentration of total unknown VOCs was 235 μ g/L detected at FTAMW-3. The total VOC concentrations at FTAMW-1 and FTAMW-2 were both below the detection limits. During the 1991 SI, the highest soil gas reading indicated VOCs in the soils just upgradient of FTAMW-3.

Semivolatile Organic Compounds: SVOCs are present in the composition of many products, such as petroleum products, tar, tires, etc., which may have been used for fire fighting practice. Ground water was analyzed for 116 SVOCs but none were detected (Table 5-4).

Total Petroleum Hydrocarbons: Because gasoline and other petroleum products were used to fuel fires at the FTA, ground water samples were analyzed for TPHC, but none were detected (Table 5-3).

Metals: Metals occur naturally in nature; however, metals may be elevated in ground water due to the impact of metal debris such as the scrap automobiles and helicopters. Metals are also used in paints and pigments which may be painted on the equipment set on fire for fire fighting practice. Ground water was analyzed for 27 metals, both total and dissolved (filtered). Ten metals were not detected in ground water: antimony, boron, cadmium, molybdenum, nickel, selenium, silver, tellurium, thallium, and tin. Metals that were detected are summarized on Table 5-3 along with their associated MCLs. Figure 5-4 illustrates the location of metals that exceed their MCL or action level.

Metals were detected at each sampling location. Antimony and lead exceeded their MCL or action level at one location (FTAMW-3) for total metals. At each monitoring

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well, the secondary MCLs (SMCL) for aluminum, iron, and manganese were exceeded in the total metals concentrations. At FTAMW-1 and FTAMW-3, the SMCL for manganese was exceeded in the dissolved metals sample. No other MCL or SMCL exceedences were reported for either total or dissolved metals; however, it should be noted that the MCLs for three metals (antimony, cadmium, and thallium) are lower than the method detection limit, thus some of the non-detect results may exceed the regulatory standards. All of the MCL exceedences for metals were reported in total metals, not dissolved metals.

Due to the natural presence of metals in ground water, it is often difficult to determine if detected metal concentrations are elevated due to site activities or represent background levels. The distribution of metals at the FTA (highest concentrations in the downgradient well) indicate that the FTA may be a source of metals contamination.

5.4.2 Sludge Sample

Volatile Organic Compounds: The sludge sample was analyzed for 41 VOCs of which five aromatic compounds were detected: benzene, dichlorobenzene, ethylbenzene, toluene, and xylenes. The compounds are indicative of petroleum products which were probably used as fuel for the fires. The highest single concentration was $9.1 \, \mu g/g$ of total xylenes. Three unknown VOCs were detected with a total concentration of $9.8 \, \mu g/g$. Table 5-5 includes the concentrations of the detected VOCs and SVOCs.

Semivolatile Organic Compounds: The sludge sample was analyzed for 116 SVOCs of which 11 known and 10 tentatively identified compounds (TICs). The TICs were identified as petroleum related compounds (Table 5-5). The total concentration of SVOCs is 440 μ g/g.

Metals: The sludge sample was analyzed for 27 metals but none were detected.

Total Petroleum Hydrocarbons: TPHCs were detected at 86,000 μ g/g in the sludge sample (Table 5-5).

5.5 Contaminant Assessment

VOC and metal contamination exceeding regulatory standards was detected in the ground water at FTAMW-3, which is located in the northwest corner of the property, downgradient of the source area. Although total and dissolved metals were detected at each of the sampling locations, metals concentrations were highest at the downgradient well (FTAMW-3). The extent of contaminant migration to the west and

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southwest of the site have not been evaluated. It is likely that ground water flowing westward discharges into the Little Patuxent River located to the west of the FTA.

The primary implications of this assessment are:

- It is likely that fire fighting activities, both recent and past, have impacted ground water quality, resulting in downgradient contamination of ground water by carbon tetrachloride.
- The extent of ground water contamination is not known to the west or southwest of the site.
- The primary direction of ground water flow may be variable due to a shallow gradient.
- The presence of TPHC and aromatic VOCs in the sludge sample, and their absence in the ground water sample, indicates that the oil-water separator is not impacting ground water in the vicinity of the wells. This may be either because the separator is not a source area, or because none of the wells are located directly downgradient of it. During the background soil sampling, one sample was collected downgradient of this area and was observed to have a sheen. This may indicate that TPHC are affecting ground water but have not migrated sufficiently northward to be detected in the monitoring wells.
- Due to the well placement, ground water downgradient of several additional
 potential sources, such as the smoke house and the burn pans, was not
 intercepted, therefore, the ground water quality may not be representative of the
 entire source area.

5.6 Data Gaps and Recommendations

The primary objective of the SIA at the FTA was to evaluate the ground water quality, determine the direction of ground water flow and evaluate the environmental impacts sustained from human activities that could influence this site's ability to be considered part of the BRAC parcel. The direction of ground water could not be determined with certainty due to a small hydraulic gradient. Some VOC contamination also was detected in ground water downgradient of the burn area. Due to the insufficient data to determine the flow direction, it is possible that contamination is transported in other directions. There are other potential sources where contamination may originate, including the burn pans and smoke house, that may not be intercepted by the downgradient well. The following data gaps and proposed actions were identified to provide a more complete understanding of the contamination present at the FTA. The USAEC is conducting a RI at the FTA which will include a detailed evaluation of site conditions. Workplans for that effort are expected to be released in May 1995 and detail the sampling and analysis program for the site.

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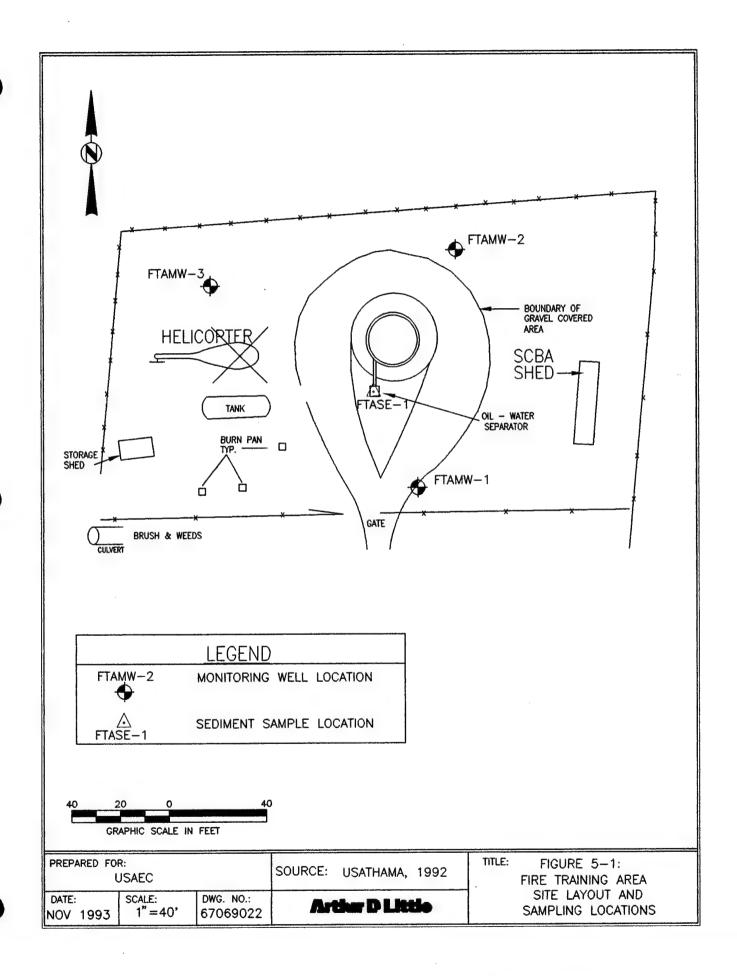
	Data Gap		Proposed Action		Rationale
to	here are insufficient data determine if the flow rection is consistent.	•	Collect water level measurements on a quarterly basis for at least one year.	٠	The consistency of the water level data will indicate if the flow direction changes.
tet is	ne extent of the carbon trachloride contamination not known either down cross-gradient.	•	Collect shallow ground water samples downgradient and cross-gradient of the potential source area and screen for VOCs using a portable field GC.	•	The data will be used to place the new wells; field screening allows for better placement of the wells and limits the total number of wells necessary.
do	nere is no well located owngradient of some stential source areas (e.g., orn pans, smoke house).	•	Install two wells downgradient of the additional source areas; locations to be chosen based on the field screening data.	•	Data will be used to evaluate if other source areas have resulted in ground water contamination.
tet	ne extent of carbon rachloride contamination wngradient from 'AMW-3 is unknown.	•	Install one well downgradient from FTAMW-3; location based on field screening results.	•	The data will be used to evaluate the furthest extent of carbon tetrachloride contamination.
COI	e carbon tetrachloride ntamination has not been nfirmed.	•	Collect ground water samples from the three existing and three new wells. Analyze samples from new wells for TAL inorganic, TCL VOCs and SVOCs, and TPHCs; analyze samples from existing wells for VOCs.	•	Data from the existing wells are necessary to confirm the previous results; data are needed from both the new and existing wells to define the extents of the carbon tetrachloride detection.
upg	o data exists regarding gradient metal ncentrations	:	Install one upgradient well. Analyze samples for VOCs and total and filtered metals.	•	Data will be used to establish background metal concentrations; the VOC analysis is included to ensure that the location has not been impacted by site contaminants.
sou fen disc	culvert exists in athwest corner of the local area and may be a charge point from bund water from the site.		Collect one discharge water sample. Collect one sediment sample from the soil directly underneath the discharge point Analyze both samples for TCL VOCs and SVOCs, TAL, and TPHC.	•	The data are important for understanding the potential impact the culvert and surface discharge may have on the site or immediately west of the site.
	O may be present in the sourface.	•	Conduct UXO clearance for all new sampling locations.	•	UXO present a safety concern that requires both downhole and surface clearances.
	draulic conductivity is known.	•	Conduct hydraulic conductivity tests in a maximum of four wells.	•	Hydraulic conductivity data are necessary for determining ground water flow velocities and contaminant travel times.

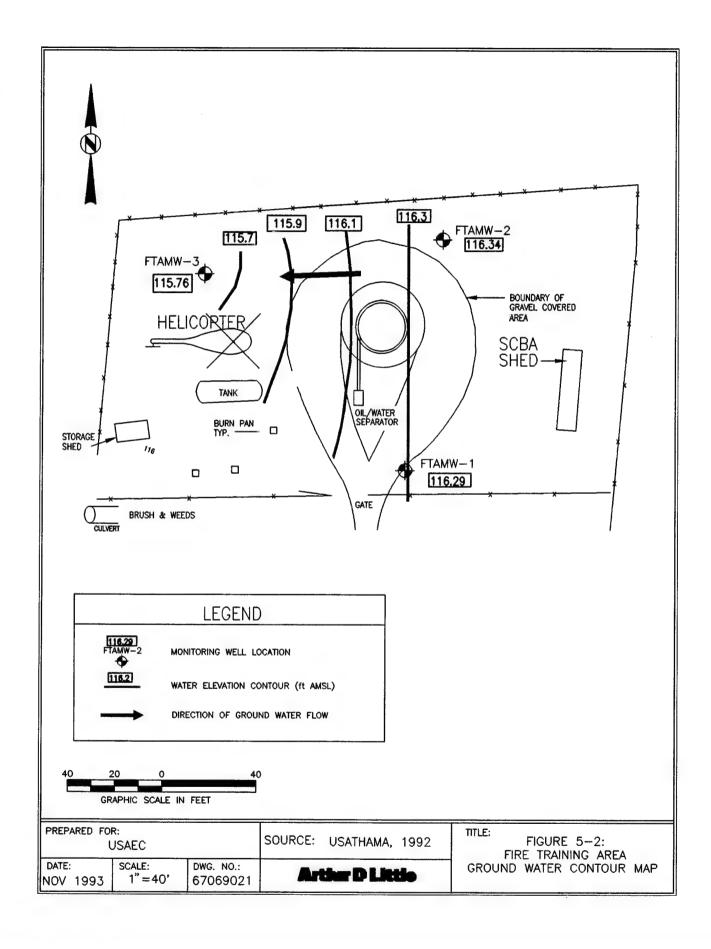
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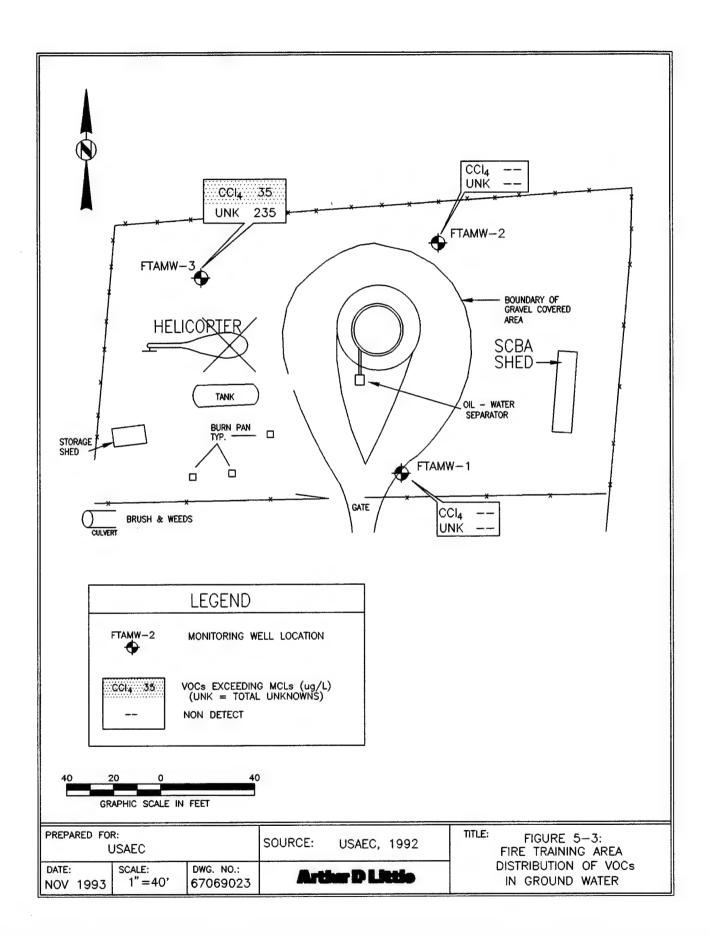
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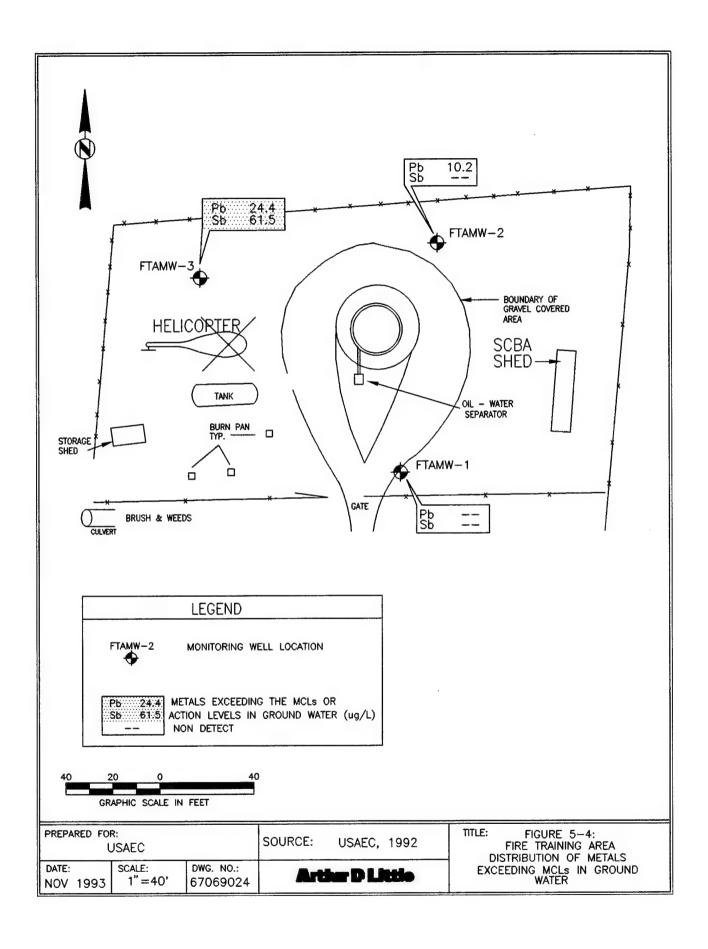
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Data Gap	Proposed Action	Rationale
Location/elevation data are needed for interpretation of hydrologic conditions.	Survey in the new wells.	 Location data are needed for data entry into IRDMIS. Elevation data are needed for construction of ground water contour maps.
A Record of Decision (ROD) may be needed for site completion.	Conduct ecological and human health risk assessments (additional surficial soil samples may be required to complete the risk assessments). Complete a feasibility study and proposed plan.	Additional tasks are required for a ROD.









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Table 5-1: Ground Water Elevation Data

			Date	e: 2/18/93
Site ID	Ground Elevation	MP Elevation	DTW	Elevation
	ft MSL	ft MSL	ft	ft MSL
FTAMW-1	118.36	120.71	4.42	116.29
FTAMW-2	119.49	121.88	5.54	116.34
FTAMW-3	117.86	120.37	4.70	115.67

Notes:

MSL - mean sea level

MP - measuring point (notched or marked PVC) unless noted otherwise

DTW - depth-to-water from the measuring point

Table 5-2 Summary of Laboratory Samples for the Fire Training Area - As Collected Fort George G. Meade, Site inspection Addendum

TYPE OF SAMPLE	SITE	FIELD	DATE SITE TYPE		MEDIA	3 E	DEPTH TCL SVOCs	TCL	7CL VOC P	PHC FI	TAL FMET U	TAL	TCLP ORG/ MET	PCB	EXP	2 5	NO3 TDS	S SO	SO4 PES
SOIL INVESTIGATION	Z																		
Background Solls	BKG-13 BKG-14	B1A0013 B1A0014	012893	AHOL AHOL	888	zz	23FT 23FT	00	00	0 0	0		00	00	00	00	00	00	
SOURCE INVESTIGATION	ATION																		
Sludge Sample	FTASE-1	FTASE-1 F1D0001	011894 SUMP	SUMP	CSE	z	0-6 IN	-	-	-	0	0	0	0	0	0	0	0	0
GROUND WATER INVESTIGATION	VVESTIG/	NOLLY																	
Ground Water Samples	FTAMW- FTAMW- FTAMW-	FTAMW-1 F1M0001 FTAMW-2 F1M0002 FTAMW-3 F1M0003	021893 021893 021893	WELL WELL WELL	caw caw	zzz	888						000	000	000	000	000	000	000
Field Blanks	93QC-15	93QC-15 Q1XF152	021893 FBLK	FBLK	CSW	z	≸	-	-	-	-	-	0	0	0	0	0	0	0
Rinse Blanks	93QC-25	93QC-25 Q1XR252	021893 RNSW	RNSW	CSW	z	¥	-	-	-	-	-	0	0	0	0	0	0 0	0

IRDMIS Site Type Codes: WELL-water, AHOL-auger hole (1) indicates if sample location is new (N) or existing (E)

FBLK-field blank, RNSW-rinse water

IRDMIS Media Codes; CGW=chemical ground water, CSO=chemical soil

Depths for ground water samples: UP=upper Patapsoo, LP=lower Patapsoo, PX=Patuxent, ND=not determined or unclear CSW-chemical surface water

NA - not applicable

Shading indicates changes from the original SOW

TCL, SVOCs - Serrivolatile Organics, Target Compound List TCL, VOCs - Volatile Organics, Target Corrpound List

PHC - Petroleum hydrocarbons

TAL UMET - Unfiltered metals, Target Analyte List ORGMET - organics/metals TAL FMET - Fillered metals, Target Analyte List

EXP - Explosives

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Table 5-3: Field Screening, Metals and Petroleum Hydrocarbon Data for Ground Water from the Fire Training Area

Semple Location Identification			TANAVS	= 142.VS	**************************************	27.VV.C	S SSS Z/ANY/S SSSS	######################################
Field Sample ID			PIM0001Y	FIMODOTZ	FIMOROTY	F:ME0027	F:MEDGSY	PIMOOSZ
Site Type			WELL	WELL	WELL	WELL	WELL	WELL
Screen Start Depth (ft bgs)			3.5	25	3.6	3.6	3.8	2.6
Screen End Depth (It bgs)			13.5	13.5	13.6	13.5	13.5	13,6
Media			CGW	CGW	CGW	DGW	CGW	CGW
Total/Diseastyed			Total	Dissolved	Total	Dissolved	Tatel	Dissolved
Collection Date			18-Feb-93	18-Feb-93	18-Feb-43	18-Feb-93	18-Feb-93	18-Feb-98
QC Type								
FIELD PARAMETERS								
pH			7.43		5.59		5.06	
Conductivity (umhos/cm2)	I		0.127		0.1		0.111	
Temperature (C)			7.3		8.8		6.3	
Turbidity (NTU)			8		140		>999	
METALS (ug/L)	MCL	SMCL/MCLG						
Aluminum	_	50-200 S	1,320	-	7,460	_	23,700	_
Antimony	6	- G	_	_	_	-	61.5 *	_
Arsenic	50	-	-	_	-	_	5.82	-
Barium	2,000	- G	44.5	24.6	65.6	18.7	178	46.9
Beryllium	4	- G	-	-	-	_	2.35	-
Calcium	i -	-	14,200	13,800	14,600	12,400	14,100	12,800
Chromium	100	-	-	-	23.1	_	57.9	-
Cobalt	-	-	-	-	-	28.8	37	31.9
Copper	1,300	1,000 G	-	_	-	_	31.3	-
ron	-	300 S	2,820	-	15,200	-	44,400	115
ead	15	-	-	-	10.2	-	24.4	_
Magnesium	-	-	4,290	3,750	3,810	1,960	8,060	3,460
Manganese	-	50 S	94.7	67.5	155	35.9	637	327
Mercury	2	- G	-	-	-	_	0.1	-
Potassium	-	-	1,740	1,780	3,570	2,740	5,130	1,710
Sodium	-	-	2,380	2,320	3,150	2,820	2,920	2,980
/anadium	-	-	-	-	-	-	101	-
Zinc	-	5,000 S	-	-	34.8	-	762	-
IEAVY METALS			0	0	33	0	90	0
TOTAL METALS			26,889	21,742	48,079	20,003	99,523	21,471
TOTAL PETROLEUM HYDROCARBONS			ND	NA	ND	NA	ND	NA

NOTES:

Only detected analytes are included on this table, for full data set see the appropriate appendix Asterisks (*) indicate analytes present above primary standards (e.g., MCL, maximum AWCC)-MCL - maximum contaminant level, MCLG (G) - MCL goal, SMCL (S) - secondary MCL

Dashes (--) indicate that no standard (e.g., MCL, SMCL, MCLG) exists or that the analyte is present below detection limits

Action levels for lead and copper are listed under MCLs. Heavy metals include Sb,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag

NA-not analyzed; ND-no analytes detected in this class

Table 5-4: Organic Compounds in Ground Water from the Fire Training Area

Sample Location Identification Field Sample ID Sita Type Screen Start Depth (If bags) Screen End Depth (If bags) Media Collection Date QC Type			FTAMW-1 F1M0001Y WELL 3.5 13.5 CGW 18-Feb-93	FTAMW-2 F1M0002Y WELL 3.6 13.6 CGW 18-Feb-93	FTAMW-3 F1M000/3Y WELL 3.6 13.6 CGW 18-Feb-93
VOLATILE ORGANIC COMPOUNDS (ug/L)					
HALOGENATED ORGANICS	MCL SM	CLMCLG			
Carbon Tetrachloride	5	- G	_	_	35 *
TENTATIVELY IDENTIFIED COMPOUNDS (TICs)					
Total Number of TICs			0	0	
Total Concentration of TICs	-	-	_	_	235
Total VOC			o	0	270
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)			ND	ND	ND

NOTES:
MCLs = maximum contaminant levels; S = secondary MCLs (SMCLs); G = MCL goals (MCLG)
Asterisks (*) indicate analytes present above primary standards (e.g., MCL, maximum AWQC)—
Dashes indicate that no standard exists (e.g. MCL or SMCL/MCLG) or that the analyte is present below detection limits
Only detected analytes are included on this table, for full data set see appropriate appendix
ND indicates that no analytes were detected in this class

TABLE 5-5: Organic Compounds In Sediment from the Fire Training Area Page 1 of 1

Site ID Field Sample ID Site Type Start Depth (ft) End Depth (ft) Media Collection Date	FTASE-1 F1D0001A SUMP 0 0.5 CSE 18-Jan-94
VOLATILE ORGANIC COMPOUNDS (ug/g)	
AROMATICS Benzene Toluene Ethylbenzene m-Xylene Xylenes	0.57 4.7 1.4 4.3 4.8
CHLORINATED AROMATICS Dichlorobenzene, nonspecific	1.6
TENTATIVELY IDENTIFIED COMPOUNDS (TICs) Total number of TICs Total Concentration of TICs	3 9.8
TOTAL VOCS	27.2
SEMIVOLATILE ORGANIC COMPOUNDS (ug/g)	
CHLORINATED MONOCYCLIC AROMATICS 1,2-Dichlorobenzene	11
NITROSAMINES N-Nitroso diphenylamine	60
PHTHALATES Bis (2-Ethyl hexyl) Phthalate	7.8
POLYNUCLEAR AROMATICS Naphthalene 2-Methylnaphthalene Fluorene Phenanthrene Anthracene Fluoranthrene Pyrene Chrysene	30 70 27 60 23 2.2 6.8 2.7
TENTATIVELY IDENTIFIED COMPOUNDS (TICs) Total number of TICs	.3
Total Concentration of TICs TOTAL SVOC	129 430
TOTAL PETROLEUM HYDROCARBONS (ug/g)	86,000

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6.0 Physical Characterization and Contaminant Assessment of the Helicopter Hangar Area (HHA)

6.1 Introduction and Background

The HHA is located immediately west of the Tipton Airfield (Figures 1-2 and 6-1). The HHA consists of a helicopter hangar and two parking areas, one to the north (automobile) and one to the south (helicopter) of the hangar. The HHA is used primarily for servicing and storing helicopters. Materials used to service aircraft such as JP-4, hydraulic and lubricating oils, detergents, and solvents (MEK, toluene, naphtha, isopropyl alcohol) are stored on the premises.

North of the parking lot is the deluge pumping station. Former fuel storage tanks located outside of this station resulted in petroleum contaminated soil and ground water in this area. The tanks and contaminated soil were removed in January 1990 and five monitoring wells were installed. Free product, probably from the former tanks, was detected above the ground water. As a result of this discovery, a recovery system was installed in MW-1 in September 1990. In December 1990, MW-1 was discovered to be dry and a second, deeper recovery well was installed (MW-6). Another storage tank, containing No. 2 fuel oil, was also located near the parking lot's northwest corner.

During Arthur D. Little's site visit, the two discharges into the Little Patuxent River were observed. The more northerly outfall is reportedly connected to the building and serves as a drain for stormwater runoff. The southern outfall discharges water from the facility's oil-water separator. An odor was observed near the southern outfall during the site visit. The oil-water separator, located off the helicopter hangar's southwest corner, collects runoff from the helicopter pads, wash rack, oil storage areas, and drains inside the hangar.

A soil gas survey conducted as part of the overall FGGM SI (EA Engineering, Science and Technology, 1992b) located areas of elevated VOCs (up to 3,000 ppm total VOCs). The highest concentrations were from points on or adjacent to the parking lot.

6.2 Summary of Investigation for Study Area

6.2.1 Proposed Scope of Work

The objective of the SIA field investigation at the HHA was to determine if activities in this area, such as use of oil storage tanks and oil-water separators, and river discharges, have impacted soil, ground water, or the Little Patuxent River. The tasks conducted to achieve these objectives included:

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- Installation of one monitoring well in the area of the highest soil gas concentration
- · Collection of ground water samples from the new and existing wells
- Completion of location and elevation surveys of the new and existing wells
- Collection of eight soil samples (four for analysis) from the oil-water separator area
- Collection of five surface water and five sediment samples from the Little Patuxent River. The river samples were from upstream, adjacent to, and downstream of the HHA.

The site layout and sampling locations are illustrated on Figure 6-1.

6.2.2 Approved Deviations

The samples were collected as proposed with the following changes.

- No sediment sample could be collected at one location, HHASE-5, because no sediment was present.
- The soil samples associated with the oil-water separator were not collected because the base of the separator was too deep for appropriate samples to be collected using a hand auger. Access was also limited due to frozen ground and building activities.
- Due to odors and visible sheens from four of the wells at the HHA, the purge water was drummed instead of being released to the ground surface.

6.3 Physical Characterization of the Study Area

6.3.1 General Description

The HHA is bordered to the west by the little Patuxent River and to the north by a small tributary to the river. Three buildings are located in this area: the deluge pumping station (Building 91), the helicopter hangar (Building 90) and a storage shed located west of the hangar. Paved parking areas are located north (cars) and south (helicopters) of the hangar. The HHA is surrounded by a fence that is secured from both the river and the road. The area outside the fence and along the river is wooded. The banks of the river are generally steep.

The small tributary located north of the HHA is approximately 6 feet wide and drains the area north and west of the HHA. Silty water with a sheen was observed in the tributary during the January 1994 sampling event.

The Little Patuxent River is approximately 30 feet wide. Upstream of the HHA, the waste water treatment plant discharges water with noticeable foam. The northern outfall at the HHA is a small channel (less than 6-inches wide); it was unclear if any

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water was being discharged from this outfall at the time of sampling. The southern outfall at the HHA is from the oil/water separator and consists of an approximately 4-foot diameter steel pipe and was visibly discharging at the time of sampling. The river depth at the southern outfall limited collection of a direct discharge sample.

6.3.2 Geology

One well (HHA-6) was installed during the SIA. The soil at that location was representative of fill material. It was generally sand with some gravel. Although little data are available regarding geology, the position of the HHA relative to the IL2 suggests that the uppermost geological formation at the HHA is likely to be the lower Patapsco formation. Soil boring and well construction information for some of the HHA wells provided by EMO, is included in Appendix C.

6.3.3 Hydrogeology

The unconfined aquifer at the HHA is probably the lower Patapsco aquifer. All of the shallow wells are screened in this aquifer. The existing wells were installed and are regularly sampled by the Environmental Management Office (EMO). These wells are referred to in this report and in IRDMIS as HHAME-1 through HHAME-6 to indicate that they are wells from the HHA but associated with the EMO. Wells HHAME-1, HHAME-4 and HHA-6 are installed so that the screened interval intersects the water table which ensures that any floating petroleum product is encountered. It is unknown if the remaining wells intersect the water table because no information was available regarding their construction.

A complete round of depth-to-water measurements was conducted on January 20, 1994. The measurements and their corresponding water level elevations are reported on Table 6-1. Depth to ground water ranged from 4.0 to 8.17 feet below ground surface with a corresponding range in elevations from 97.43 to 101.64 feet MSL. The steepest hydraulic gradient, 0.036 feet/feet, is found between HHA-6 and HHAME-5. As illustrated on Figure 6-2, the ground water generally flows northwest with components flowing more directly north and west.

6.4 Nature and Extent of Contamination

During the SIA field investigation, soil, ground water, surface water and sediment samples were collected to evaluate the nature and extent of contamination. The results of these sampling activities are described below. The data tables presented in this section provide a summary of the samples in which contamination was found. A complete summary of the data for each sample can be found in Appendix J. Table 6-2 summarizes the laboratory samples collected from the HHA including site IDs, site types, media codes, and analytical parameters. Sample locations are illustrated on Figure 6-1.

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6.4.1 Soil

One soil sample was collected during the drilling of HHA-6 and analyzed for VOCs and TPHC. The sample was collected from 10 to 12 feet below grade and selected for laboratory analysis because an odor was observed. However, no VOCs or TPHC were detected in the soil sample.

6.4.2 Ground Water

Six ground water samples were collected and analyzed for VOCs, SVOCs, TPHCs and total and dissolved metals.

Field Screening Readings: During the sampling process, field measurements were made of the ground water for pH, conductivity, temperature and turbidity. The field parameters are indicative of general water quality and are included in Table 6-3 along with the metals data. For surface water, pH ranged from 6.04 to 6.71. Conductivity ranged from 0.094 to 0.444 μmhos/cm². Temperature ranged from 4.8°C to 11.6°C. Turbidity ranged from 6 to >999 NTUs. In general, the field screening readings are within the normal range. The low temperature measured for HHAME-1 was because there was a slight lag period between sampling and the field parameter measurements during which the sample was allowed to remain outside. This is not expected to affect the other readings appreciably.

Several observations were made during the purging and sampling which indicate the presence of contaminants:

- Water from HHAME-1 had a strong odor and a visible sheen. The color was black throughout the purging period.
- Water from HHAME-2 had a noticeable odor. The color was initially black but became clear with purging.
- Water from HHAME-3 had a strong odor and a visible sheen. The color was initially black but became clear with purging.
- Water from HHAME-4 had no noticeable odor and was clear throughout purging.
- Water from HHAME-5 had a noticeable odor and a sheen. The color was orange-brown throughout purging.
- Water from HHA-6 had an odor and a sheen. The color was clear throughout purging.

Volatile Organic Compounds: Petroleum products, depending upon their composition, contain VOCs such as benzene, toluene, ethylbenzene and xylenes. The six ground water samples were analyzed for 41 VOCs. Although no VOCs of known compounds were detected, nine tentatively identified compounds (TICs) were detected (Table 6-4). The TICs were identified as hydrocarbon related compounds.

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The highest concentrations of TICs were detected in wells HHA-6 and HHAME-1. All volatiles analyzed during this project are listed in Table HHA-1 in Appendix J. This list includes all volatiles on the TCL, plus the following analytes: 1,3-dichlorobenzene, dichlorobenzene, 1,3-dichloropropane, (2-chloroethoxy)ethene, acrylonitrile, trichlorofluoromethane, and vinyl acetate. Carbazole is a semivolatile compound on the TCL that was not included in the analyses during this project. However, this compound was not identified as a TIC during this project. Figure 6-3 illustrates the distribution of contaminants at the HHA.

Semivolatile Organic Compounds: The storage of oils and other materials at the HHA may have resulted in the release of SVOCs into ground water. The six ground water samples were analyzed for 116 SVOCs, of which 3 were detected (Table 6-4). Bis(2-ethylhexyl)phthalate and endrin were detected in one location each (HHAME-4 and HHAME-1, respectively) and 2-methylnaphthalene was detected in two locations (HHAME-1 and HHAME-3). Phthalates are common laboratory contaminants, and it is possible that the phthalate is not representative of ground water chemistry. Endrin was only detected in one location, but above the MCL. The 2-methylnapthalene is a polynuclear aromatic compound which is indicative of contamination by diesel or heating fuel.

Thirty-two SVOC TICs were detected during analysis. These TICs are also related to hydrocarbon contamination. The highest concentrations of SVOC TICs were detected in HHAME-1 (1,690 μ g/L) and HHAME-3 (258 μ g/L).

Total Petroleum Hydrocarbons: The six ground water samples were analyzed for TPHC. Samples from two of the wells contained detectable TPHCs, 25,000 μ g/L in HHAME-1 and 3,700 μ g/L in HHAME-3 (Table 6-4). The locations with detectable TPHCs correspond to the samples in which strong odors were observed. A dilution factor of 10 was used for the TPHC analysis for HHAME-1. All other samples did not require a dilution.

Metals: Metals are naturally occurring elements and are commonly found in ground water. The six ground water samples were analyzed for 27 metals, of which 21 were detected: aluminum, arsenic, barium, beryllium, calcium, cadmium, cobalt, chromium, copper, iron, mercury, potassium, manganese, magnesium, sodium, nickel, lead, tin, selenium, vanadium, and zinc. The detected metals are summarized on Table 6-3.

To evaluate which metals are present at elevated concentrations, the metals are compared against MCLs. Primary MCLs or action levels are exceed for antimony (1 location), arsenic (1 location), cadmium (2 locations), chromium (2 location), and lead (3 locations). With the exception of lead in HHA-6 and chromium in HHAME-2, all of the samples in which metals exceed MCLs are from either HHAME-4 or HHAME-5. The distributions of four metals which exceeded MCLs are illustrated on Figure 6-3.

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The highest concentrations of metals in ground water were detected in the central and eastern end of the northern parking lot in wells HHAME-4 and HHAME-5. Total heavy metals (a summation of the concentrations of antimony, arsenic, beryllium, cadmium, chromium, lead, nickel, selenium, and silver) was calculated as parameters for comparison between the wells. The concentration of heavy metals ranged from 14 µg/L in HHAME-3 to 599 µg/L in HHAME-4 (based on unfiltered samples). The distribution of total heavy metals is also illustrated on Figure 6-3.

Comparison of the metals data with the organic data indicates that the ground water is probably impacted by multiple sources. The tanks near the Deluge Pumping Station are the most likely source for the contamination of TPHCs in adjacent wells HHAME-1 and HHAME-3. The metals contamination is primarily under the parking lot. Possible sources of metals contamination include maintenance activities, such as degreasing or painting, or the fill that was used for construction. The metals suite is suggestive of a paint source.

The Hanger 90 Area is another possible source area; it was the location of an old fire training area, and includes an abandoned (to be removed) acid neutralization pit.

6.4.3 Surface Water and Sediment

Five surface water and four sediment samples (plus one sediment duplicate sample) were collected and analyzed for VOCs, SVOCs, TPHC and total metals.

Field Screening Readings: During the sampling process, field measurements were made of the surface water for pH, conductivity, temperature and turbidity. The field parameters are indicative of general water quality and are included in Table 6-5. For surface water, pH ranged from 6.78 to 7.04. Conductivity ranged from 0.590 to 1.29 µmhos/cm². Temperature ranged from 0.2°C to 1.2°C. Turbidity ranged from 31 to 128 NTUs. None of the measurements were outside of the expected range; no trends were observed.

Volatile Organic Compounds: The VOCs expected to be encountered in the river include those related to petroleum products, materials used for helicopter maintenance, and materials stored in the storage shed. The samples were analyzed for 41 VOCs but none were detected in either surface water or sediment.

Semivolatile Organic Compounds: SVOCs are also present in the composition of petroleum products. The surface water and sediment samples were analyzed for 116 SVOCs. No SVOCs were detected in surface water. Two SVOCs were detected in sediment (Table 6-6). Di-n-butyl phthalate was detected in sediment at HHASE-1 and fluoranthene was detected in sediment samples HHASE-1 and HHASE-4. Additionally, SVOCs TICs were detected in all four sediment samples with total concentrations between 3.9 and 10.4 μ g/g. The highest concentration of SVOCs was detected at the upstream location.

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Total Petroleum Hydrocarbons: No TPHCs were detected in either the surface water or the sediment samples (Table 6-6).

Metals: Metals are naturally occurring elements and are commonly found in surface water and sediment. The samples were analyzed for 27 metals, of which 9 were detected in surface water and 16 were detected in sediment. The detected metals are summarized on Tables 6-5 and 6-7. Total metals and total heavy metals are tabulated for a relative comparison between the samples.

One of the metals detected in surface water, zinc, has an ambient water quality criteria (AWQC), but all of the detected concentrations were below the maximum and continuous AWQC concentrations. Total metals ranged from approximately 140,000 to 240,000 μ g/L, of which sodium was the primary contributor. The sodium is most likely due to use of road salt in the winter. No heavy metals were detected in the surface water.

Total metal concentrations in sediment ranged from approximately 4,000 to 43,000 μ g/g and total heavy metals ranged from 5 to 52 μ g/g. The upstream sample, HHASE-1, had the highest concentration of both heavy metals and total metals.

To help evaluate if the sediment concentrations are elevated, they were compared against the National Oceanographic and Atmospheric Administration (NOAA) Sediment Guidelines. The guidelines are protective of both freshwater and marine benthic organisms. NOAA guidelines that have been developed include values referred to as an effects range-low (ER-L) and an effects range-median (ER-M). The ER-L is the concentration at which 10 percent of the bioassay test species exhibited an effect, while the ER-M is the concentration at which 50 percent of the test organisms exhibited an effect. The ER-L and ER-M are included along with the sediment data on Table 6-7. All of the metals in the sediment samples fall below the ER-L, indicating that they are not present at concentrations that are impacting aquatic life. Surface water and sediment chemistry are illustrated on Figure 6-4.

To further evaluate if the detected analytes in sediment were present at elevated concentrations, but not to determine if regulatory limits had been exceeded, we have compared the maximum sediment data collected at the HHA against three different sediment criteria: NOAA, Ontario Ministry of the Environment, and Washington State Department of Ecology (WDOE) (Table 6-8). No detected concentrations exceeded either the NOAA or the WDOE criteria. The maximum concentration of barium was present above the Ontario Severe Effect concentration. Other detected barium concentrations were between the lowest effect and the severe effect. All other metals were within the Ontario criteria. In general, there were no significant differences in interpretation regardless of which sediment criteria were used. It should also be noted that sample HHASE-1, which contained the highest concentrations of all but one analyte, was collected upstream from the HHA and it is highly unlikely that it was influenced by the HHA. Therefore, for the samples that may have been

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impacted by the HHA, none exceeded the NOAA or WDOE criteria, and only the Lowest Effect level for barium was detected using the Ontario criteria.

6.5 Contaminant Assessment

The field investigation included an investigation of two main areas: ground water in the northern parking lot and surface water and sediment in the river. As part of the ground water study, it was determined that ground water generally flows northwest.

Contamination by petroleum products continues to be a problem in ground water. Organic compounds and metals were detected in all of the ground water samples. The wells closest to the pumping station contained the highest concentrations of organic compounds. The petroleum hydrocarbons and organic compounds are probably due the former tanks located in this area. Given the direction of ground water flow, it is likely that contamination from this area is flowing into the tributary located north of the area and from there into the Little Patuxent.

The metals in ground water are at their highest concentrations close to the building. Their presence could be due to the fill used in this area or may indicate another source area. The metals may be migrating into the tributary. Well HHAME-2 is located downgradient from HHAME-4 and has similar metals but at lower concentrations. This may be due to contaminant migration; however, metals are generally immobile and therefore may not migrate far from the source.

Based on a comparison of sediments with NOAA guidelines and the surface water with AWQC, it appears that the HHA is not having an adverse impact on the Little Patuxent River. If contaminants are migrating into the river, they are sufficiently diluted for their concentrations to fall below the comparison criteria.

6.6 Data Gaps and Recommendations

Data Gaps	Proposed Action	Rationale
Source of the metals contamination is unknown.	Conduct an operations review of the HHA with an emphasis on historic operations and metal uses.	Locate the source and determine if it is a continuing source requiring remediation.

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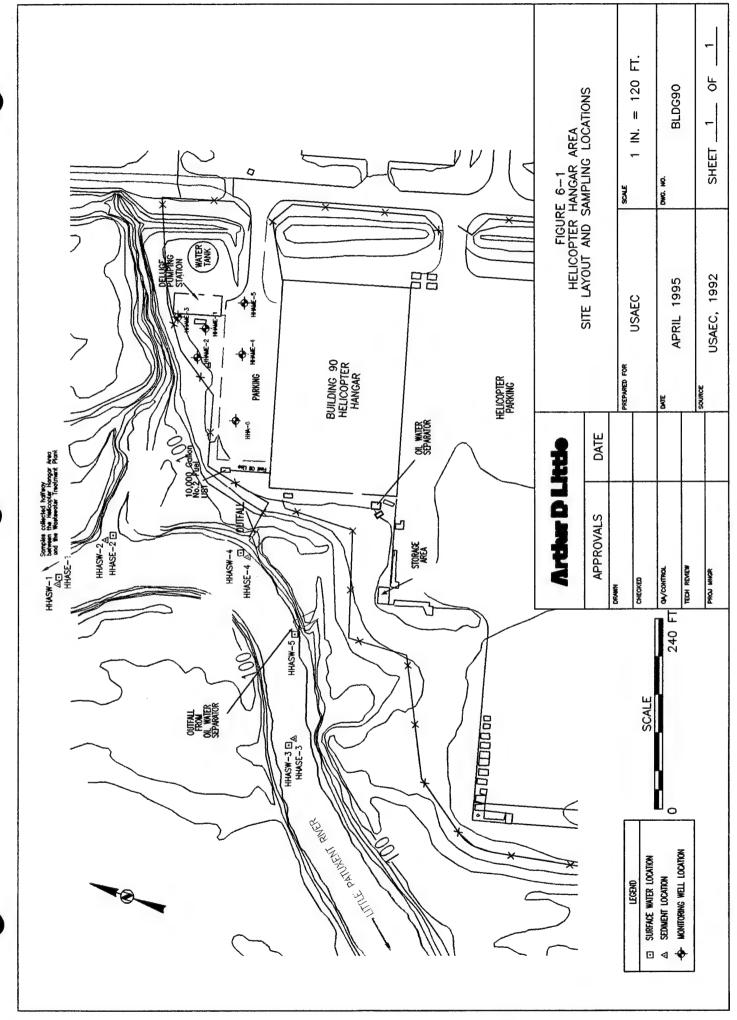
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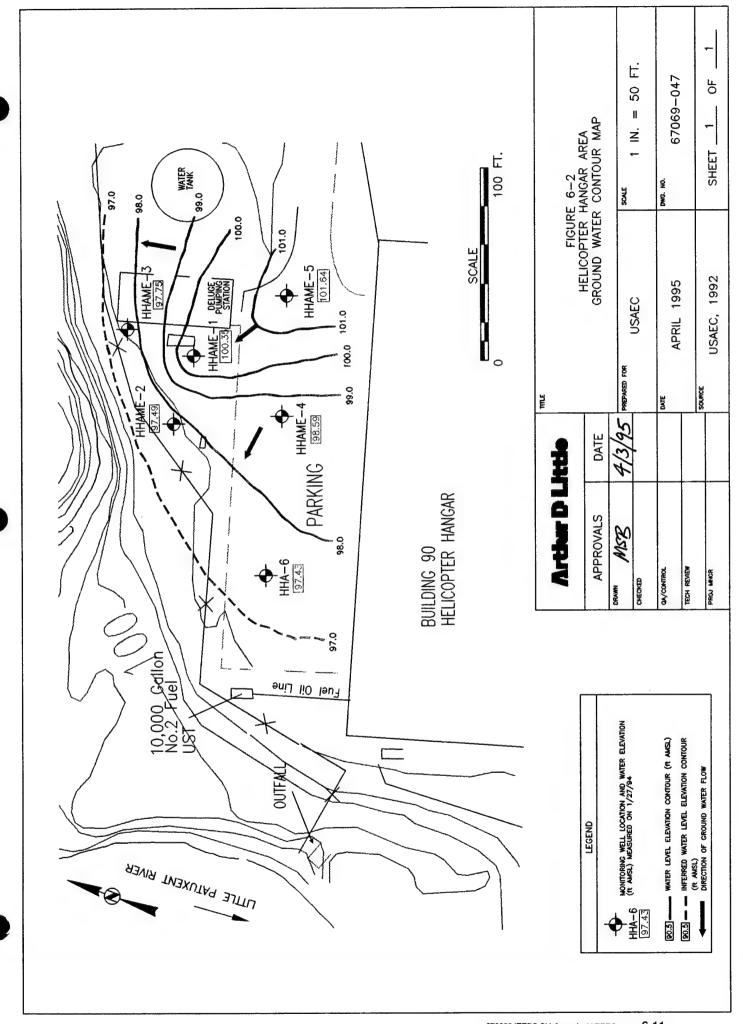
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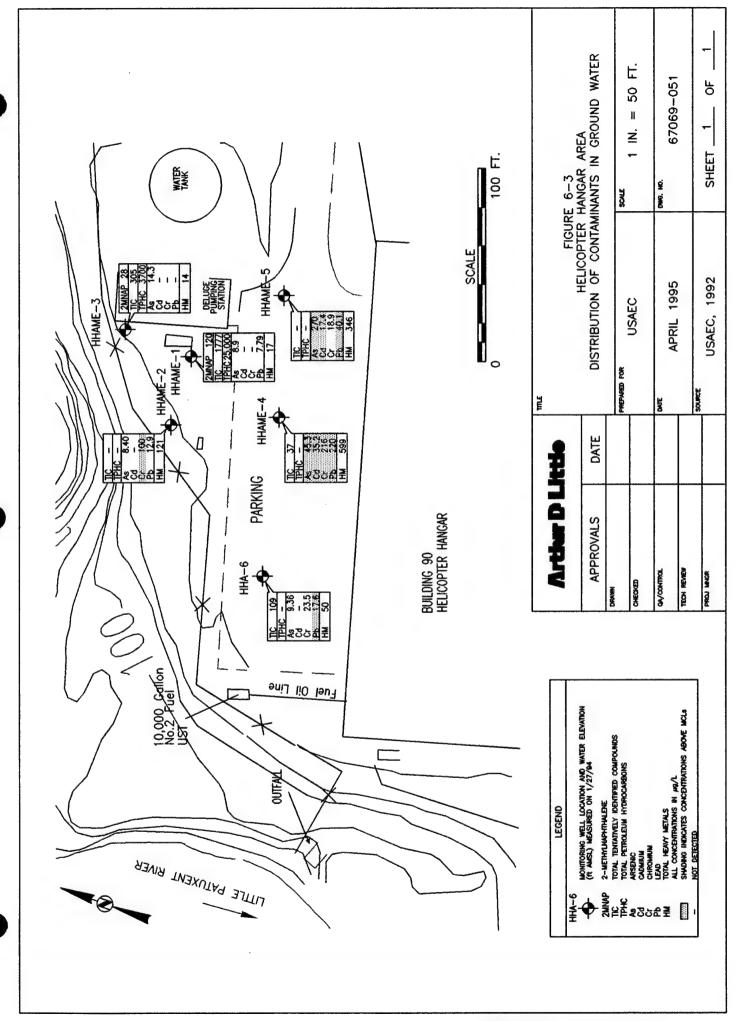
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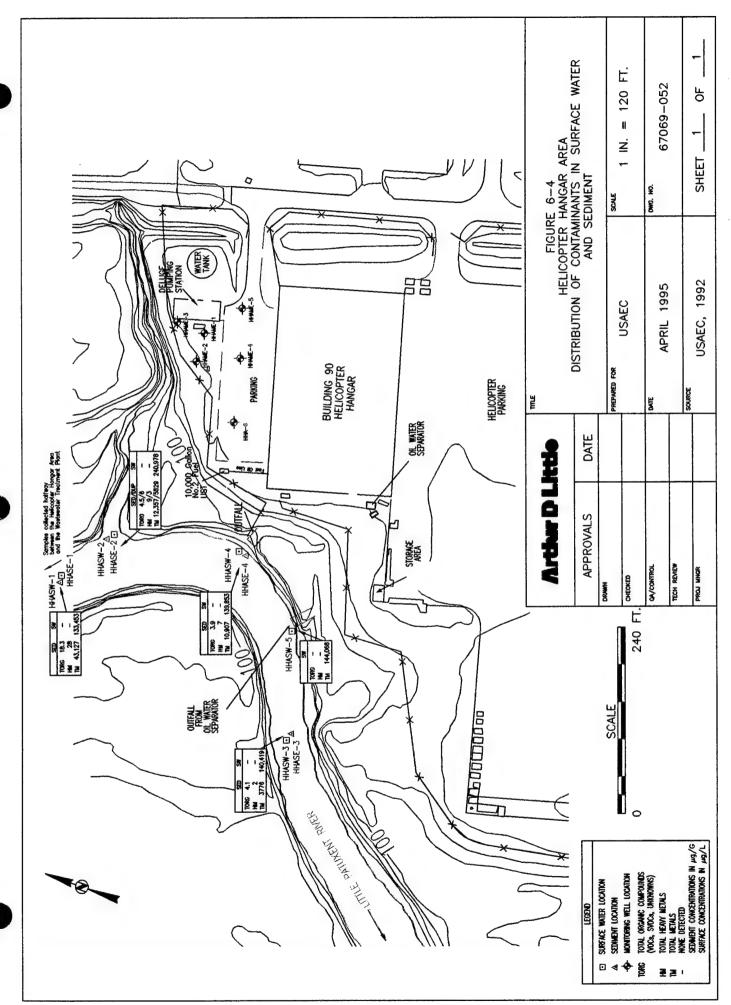
Data Gaps	Proposed Action	Rationale
Upgradient metal concentrations are unknown.	Install an upgradient well and sample ground water for metals	Determine if metals are naturally elevated.
3. It is unknown if contamination is migrating into the tributary.	Collect surface water/sediment samples in the tributary. Re-attempt collection of sediment sample HHASE-5 at oil water separator outfall.	Data are necessary to determining if ground water is discharging to the tributary and for conducting the human health risk assessment.
4. Ground water quality north of the tributary is unknown.	Install a well north of the tributary and sample ground water.	Determine if ground water contamination is migrating beneath the tributary.

The USAEC is continuing its evaluation of the Hangar 90 Area in the form of an RI. Also, the USAEC will be conducting an evaluation of the ecological risk presented to the BRAC parcel; this will include the Little Patuxent River. Details of these investigations can be found in the final RI workplans for the Hangar 90 area, expected to be released in May 1995 and the workplans for the ecological risk assessment, to be released in late October 1995.









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Table 6-1: Ground Water Elevation Data for the Helicopter Hangar Area (HHA)

		Date: 1	/20/94
Site ID	MP Elevation ft MSL	DTW ft	Elevation ft MSL
HHAME-1	105.98	5.63	100.35
HHAME-2	105.39	7.90	97.49
HHAME-3	105.92	8.17	97.75
HHAME-4	105.42	6.83	98.59
HHAME-5	105.64	4.00	101.64
ННА-6	105.49	8.06	97.43

Notes:

MSL = Mean sea level

MP = Measuring point (notched or marked PVC unless noted otherwise)

DTW = Depth-to-water from the measuring point

Summary of Laboratory Samples for the Helicopter Hangar Area - As Collected (Page 1 of 2) Fort George G. Meade, Site Inspection Addendum Table 6-2

TYPE OF SAMPLE	SITE 10	FIELD	DATE	SITE	MEDIA	N/E	DEPTH	TCL	15 V 20 S	F S	TAL	TAL	TCLP ORG/	80	EXO	ž	£ 82	Š	
SOIL INVESTIGATION																	3		ביי
Background Solls	BKG-7 BKG-8 BKG-9	B1A0007 B1A0008 B1A0009	022893 022893 022893	AHOL AHOL AHOL	888	ZZZ	23H 23H 23H	000	000	000	000		000	000	000	000	000	000	
Drilling Soil Sample	HHA-6	H1B0006	012993	BORE	8	2	10-12 FT	٥	**	-	o	0		, 6				> (- *
Auger Soils	HASS-1 HASS-2 HASS-3 HASS-1	H1A0001 H1A0002 H1A0003 H1A0004		4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	8888	ZZZZ		8888	8256	0000	8000	0000	0000	0000				, 5000	0000
Field Blank	93QC-104	Q1XF104	012993	FBLK	85	z	10-12FT	0	-	-	0	0	0	0	0	0	0	٥	0
Rinse Blank	93QC-204	Q1XR204	012993	RNSW	83	z	10-12 FT	0	-	-	0	0	0	0	0			0	• •
SURFACE WATER/SEDIMENT INVESTIGATION	IMENT INVESTIG	ATION																.	
Sediment Samples	HHASE-1 HHASE-2 HHASE-3 HHASE-4	H1D0001 H1D0002 H1D0003	012194 012194 012194 012194	STRIM STRIM STRIM STRIM	SS SS SS SS SS SS SS SS SS SS SS SS SS	zzzz	N N N N N N N N N N N N N N N N N N N	der der der der			0000		0000		0000	0000	0000	0000	0000
Surface Water	HHASW-1 HHASW-2 HHASW-3 HHASW-4 HHASW-5	H1T0001 H1T0002 H1T0003 H1T0004	012194 012194 012194 012194	STRM STRM STRM STRM STRM	CSW CSW CSW CSW CSW	zzzzz	<u> </u>		***		00000		00000	00000	00000			00000	0000
Duplicates	94QC 402 (dup of HHASE-4)	Q1DD402 4)	012194	STRM	CSE	z	NI 9-0		-	-	0	-							• •
Rinse Blanks	94OC-257	Q1XR257	012194	RNSW	CSE	z	¥.	-	-	-	0	-	0	0	0	0	0	o,	0

Summary of Laboratory Samples for the Hellcopter Hangar Area - As Collected (Page 2 of 2) Fort George G. Meade, Site Inspection Addendum Table 6-2

TYPE OF SAMPLE	SITE	FIELD	DATE	SITE	MEDIA	NE	DEPTH	TCL SVOC	TCL VOCs	PHC	TAL	TAL	TCLP ORG/ MET	PCB EXP		Z Z	8 T	S SO	CI NOS TDS SO4 PEST
GROUND WATER INVESTIGATION	STIGATION											V							
Ground Water	HHAME-1	H1ME001	012094	WELL	CGW	ш	2	_	-	-		-	0	0	0	0	0	0	0
Samples	HHAME-2	H1ME002	012094	WELL	CGW	ш	2	-	-	-	-	-	0	0	0	0	0	0	0
	HHAME-3	H1ME003	012094	WELL	SGW	ш	2	-	-	-	-	_	0	0	0	0	0	0	C
	HHAME-4	H1ME004	012094	WELL	SGW	ш	2	-	-		-	_	0	0				0	0
	HHAME-5	H1ME005	012094	WELL	OGW	ш	Q	-	-	-	-	_	0	0	0		0		0
	HHA-6	H1M0006	012094	WELL	CGW	ш	2	-	-	-	-	-	0	0	0			0	0
Rinse Blanks	94QC-258	Q1XR258	012094	RNSW	CGW	z	Q	-	-	-	-	-	0	0	0	0	0	0	0
Field Blanks	94QC-157	Q1XF157	012094	FBLK	CGW	z	Q	-	-	-	0	-	0	0	0	0	0	0	0

NOTES:

NE indicates if sample location is new (N) or existing (E)
IRDMIS Ste Type Codes: WELL-water, AHOL-auger hole, STRIM-stream
OTEL-authal, FBLK-field blank, RINSW-intres water
IRDMIS Media Codes: CGW-chemical ground water, CSC-chemical sod
CSW-chemical surfaces water, CSE-chemical sediment
Depths for ground water samples: UP-upper Patapsco., LP-lower Patapsco.
PX-Paturent, ND-not determined or unclear; NA-not applicable

TCL, VVCce - Voletile Organics, Target Compound List
TCL, SVCCe - Semivolatile Organics, Target Compound List
PHC - Petroleum hydrocarbons

TAL FMET - Filtered metals, Target Analyte List TAL UMET - Untitlered metals, Target Analyte List

ORG/MET - organics/metals

EXP - Explosives

05-Apr-94

TABLE 6-3: Field Screening and Metals Data for Ground Water from the Hellcopter Hangar Area Page 1 of 2

Bite Type Screen Start Depth (if bgs) Screen End Depth (if bgs) Total/Dissolved Collection Date OC Type			WELL TOTAL T	HIMOSSZ WELL 7 17 Dissolved 20-lan-94	HIMEOONY WELL 74- 174 174 20-lain-94	HIMBOOL WELL 74 174 Dissolved 20-lan-94	HIMBODZY WELL 74 174 Total Zoutan 44	HIMEOOZZ WELL 7+ 17+ Dissolved Z0-lam-84	HIMBOGRY WELL, B+ 19+ Total	WELL WELL WELL 194 Dissoluted
FIELD PARAMETERS										
pH Conductivity (umhos/cm2) Temperature (C)			6.47 0.444 11.6		6.71 0.307 4.8		6.04 0.094 10.5		6.47 0.197 9.2	
Turbidity (NTU)			344		88		666<		8	
METALS (ug/L)	¥CF	SMCLMCLG								
Aluminum	:	50-200 G	5,290	112	538	ı	2,950	1	1	1
Antimony	9	9	1	:	!	1	i	1	1	1
Arsenic	8 8	1	9.36	15.2	8.91	14.6	8.42	11	14.3	= ;
Bandi	om's	ı	200	42.4	38.8	8	21.7	1.74	312	30.4
Cadmium	4 10	: un	: 1	: :	: 1	1 1	: :	1 1	1 1	1 1
Calcium	1		71,100	74,100	40,000	38,300	12.400	11,400	22.600	22.600
Chromium	8	;	23.5			1	100	1	1	
Cobalt	:			:	1	1	:	1	1	ı
Copper	1	1,000/1,300 S/G		:	8	ı	188	1	1	1
Iron	;	300 S	ਲ	19,300	45,600	30,700	31,900	6,580	28,600	23,700
Lead	ŧ.	:	17.6	14.5	27.7	1	12.9	1	1	ı
Magnesium	:		10,400	10,400	2,380	5,150	, 900	1,660	3,100	3,070
Manganese	: 1	S 00Z	28	874	1,480	1,390	404	95	42	420
Mercury	~ 5		!	:	1	:	0.128	1	ı	1
Nickel	8	:	:	1 1	3	:	:	1	1	1
Potassium	1 (1	9,260	9,310	5,070	5,120	2,740	1,930	3,140	2,970
Selenium	8	:	1	1	1	1	:	1	1	1
Sodium	1	:	8,970	9,280	9,700	6,560	3,130	3,270	8,110	8,280
Vanadium	:		:	:	1	:	6 2	1	1	1
Zinc	ı	2,000 S	47.8	:	1	ı	:	26.8	1	ı
HEAVY METALS			8	8	11	10	121	=	4	=
TOTAL METALS			142,828	123.448	104.860	87.271	55.781	25.245	64.018	61.081

Only detected analytes are included on this table, for full data set see the appropriate appendix
MCL - maximum contaminant level, MCLG (G) - MCL goal, SMCL (S) - secondary MCL
Astensks (*) indicate analytes present above primary standards (e.g., MCL, maximum AWCC)Dashes (--) indicate that no standard (e.g., MCL, SMCL, MCLG) exists or that the analyte is present below detection limits
Action levels for lead and copper are listed under MCLs
Heavy metals include Sb.As.Be.Cd.Cr,Pb.Hg.Ni.Se.Ag
Pluses (+) indicate that the screen interval is based on total depth measuments and assumes a 10-foot acreen (no well log availble)

TABLE 6-3: Field Screening and Metals Data for Ground Water from the Helicopter Hangar Area Page 2 of 2

She ID Fleid Sample ID Street Start Depth (It bgs) Screen End Depth (It bgs) Total/Dissolved Collection Date OC Type			HHANEA HIMEDOAV WELL 554 454 Total 20-lan-84	HHANE4 HYMEDOZ WELL 354 455 Dissolued 20-Jan-94	HHAME-S HIMEOOSY WELL B+ 18+ Total Zoulannest	HHAME S HIMBOOKZ WELL B+ Dasolved ZO-Jarr-91
FIELD PARAMETERS						
pH Conductivity (untros/cm2) Temperature (C) Turbidity (NTU)			6.41 0.456 10.7 >999		6.65 0.388 8.1 267	
METALS (ug/L)	HCL	SMCLMCLG				
Aluminum	1	50-200 G	11,900	1	2,030	1
Antimomy	•	9	1	59.7		1
Arsenic	B	į	45.3	:	220	4.69
Barum	2,000	1	248	30.4	54.6	19.6
Beryllum	4		124	:	1	t
Cadmium	sc.	e G	35.2	1	17.4	1
Cacum	1 8	1	96,200	82,800	57,200	25,600
Colonia	3 :	1 1	216	1 1	18.9	t
Copper	:	1,000/1,300 S/G	375	:	1	1
lron	1	300 S	186,000	1	131,000	27,000
Lead	ŧ	ı	83	1	40.1	1
Magnesium	ı		16,800	10,200	6,840	5,280
Manganese	: 0	s 80 80	13,000	117	1,370	1,350
Nickel	νŝ	3 1	816.0	0.22.1	:	ı
Potassium	3 1		8.260	6.590	7.450	7.450
Selenium	S	1	5.18	1	3 1	3 1
Sodium	ı	t	10,500	10,800	7,830	8,430
Vanadium	1	:	232	:	ı	1
Zinc	ı	S 000'S	2,820	137	216	1
HEAVY METALS			299	8	346	160
TOTAL METALS			347,314	113,724	214,337	105,134

TOTAL METALS NOTES:

Only detected analytes are included on this table, for full data set see the appropriate appendix

MCL - maximum contaminant level, MCLG (G) - MCL goal, SMCL (S) - secondary MCL.
Asterisks (*) Indicate analytes present above primary standards (e.g., MCL, maximum AWCC)*
Dashes (*-) Indicate that no standard (e.g., MCL, SMCL, MCLG) exists or that the analyte is present below detection limits
Action levels for lead and copper are listed under MCLs
Heavy metals include Sb.As.Be.Cd.Cr.Pb.Hg.Mi.Se.Ag
Pluses (*-) Indicate that the screen interval is based on total depth measurments and assumes a 10-foot acreen (no well log availble)

TABLE 6-4: Organic Compounds in Ground Water from the Helicopter Hengar Area Page 1 of 1

Sile ID Field Sample ID Field Sample ID Sile Type Screen Start Depth (It bgs) Screen End Depth (It bgs) Medis Collection Date Collection Date	VOLATILE ORGANIC COMPOUNDS (ug/L) TENTATIVELY IDENTIFIED COMPOUNDS (TICs) Total Number of TICs Total Concentration of TICs	SEMIVOLATILE ORGANIC COMPOUNDS (ug/L) PHTHALATES Bis (2-Etryl hexyl) Phthalate	POLYNUCLEAR AROMATICS 2-Metryinaphthalene		TENTATIVELY IDENTIFIED COMPOUNDS (TICs) Total Number of TICs Total Concentration of TICs		TOTAL PETROLEUM HYDROCARBONS (ug/L)
	L MCLG/SMCL	1	1	2 6	1 1		ı
HHA-6 HHM0006Y WELL 7 17 17 CGW 20-lan-94 Total	2 109	ı	1	1	00	0	ı
HHAME-I HIMEDOIY WELL 7+ 17+ COW ZO-Jan-94 Total	6 87	ı	52	* 81	1,690	1,828	55,000
HHAME2 HIMEDO2Y WELL 7+ 17+ CO3W 20-Jun-94 Total	00	ı		1	00	0	1
HHAME-3 HIMEDGRY WELL 9+ 19+ CSSW 20-Jun-94 Total	3 47	1	8	ı	15 858	586	3,700
HHANE4 HIMESOAY WELL 35+ 45+ CCW 20-Jan-94 Total	00	8	1	ı	97	8	1
HHAMES HIMEDOSY WELL 8+ 18+ CCW ZO-Jan-94 Total		ı	1	l	. 00	0	1

Only detected analytes are included on this table, for full data set see the appropriate appendix MCL - maximum contaminant level, MCLG (G) - MCL goal, SMCL (S) - secondary MCL

Dashes (-) indicate that no standard (e.g., MCL, SMCL, MCLG) exists or that the analyte is present below detection limits. Pluses (+) indicate that the screen interval is based on total depth measuments and assumes a 10-foot screen (no well log available). Asterisks (*) indicate analytes present above primary standards (e.g., MCL, maximum AWCC).

TABLE 6-5: Field Screening and Metals Data for Surface Water from the Helicopter Hangar Area Page 1 of 1

CSSW CSSW 6.92 0.59 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75
CSW -lan -34 Total 0.7 128 0.7 133,453 0 90,000
MAX MAX

NOTES:
Only detected analytes are included on this table, for full data set see the appropriate appendix
AWCC - ambient water quality criteria, MAX - maximum, CONT - continuous
Dashes (-) indicate that no standard (e.g., AWCX) exists or that the analyte is present below detection limits
Heavy metals include Sb, As, Be, Cd, Cr, Pb, Hg, Ni, Se, Ag

TABLE 6-6: Organic Compounds in Sediment from the Heilcopter Hangar Area Page 1 of 1

Feld Sample ID Site Type Start Depth (it bgs) End Depth (it bgs) Media Collection Date QC Type		- 	HHASE: HIDOONIA STRIK B CUS COSE 21-Jan-94	HRASE2 HI DONZA STRM 0 0 0 CSE 21.Jan 94	HHASE3 HIDOOCIA STRM 0 0 0.5 CSE 21-Jan-84	HHASEA HIDODOAA STRW O 0 0 0.5 CSE CSE CSE	B40C-402 Cilppacza SIRM SIRM 0 0 0.5 CSE CSE
VOLATILE ORGANIC COMPOUNDS (ug/g)			QV	QV	S	ğ	Dup of HHAS
SEMIVOLATILE ORGANIC COMPOUNDS (ug/g)	AWGC	TWOS				2	S
	1	ı	u u				
OMATICS	3980	1 1	6 8	1	l	1	1
TENTATIVELY IDENTIFIED COMPOUNDS (TICs) Total Number of TICs Total Concentration of TICs	1	ı	9	מ ו	1 4	0.062	l c
TOTAL SVOC	ı	ı	4. 9t	ი 4 ი	1. 4	3.9	14 4
TOTAL PETROLEUM HYDROCARBONS		1					4
NOTES: Only detected analytes are included on this table, for full data set see the appropriate appendix AWQC - ambient water quality criteria, MAX - maximum, CONT - continuous Dashes (-) indicate that no standard (e.g., MCL, SMCL, MCLG) exists or that the analyte is present below detection limits NA-not analyzed; ND-no analytes detected in this class	ta set see ONT - cor	the appropri	ate appendix analyte is pres	ent below detection	n fimits	1	1

TABLE 6-7: Metals in Sediment from the Hellcopter Hangar Ares Page 1 of 1

Hed Sample ID Sile Type Start Depth (it bgs) End Depth (it bgs) Media Collection Date QC Type		HHASEA HIDOOOTA STRM 0 0.0 0.0 CSE 21-Jan-44	HHASE 2 HIDGOOZA SIRM O 0 CSE Z1-Jan-94	HHASE3 HIDDOGGA STRM STRM 0 0 0 CSE Z1-Jan-54	HHASE4 HIDDOGAA STRM STRM 0.0 0.3 CSE Z1Jan-94	940C-402 C10D402A STRM STRM 0 0 0.5 CSE 21-Jan-64
METALS (ug/g)	NOAA ER-L EF	ER-M				Dup, of HHASE.4
Aluminum	ı			9	200	
Barium Berviii im	1	110	6.78	7.89	8	000 000 000 000 000 000 000 000 000 00
E Co	ı			1	1	ì
Chromium		145		136	332	382
Cobalt				/87	6.52	8.32
Copper				: :	6.6	3.89
	1 8			1,870	6.380	7.200
Magnesium				1.66	3.88	4.46
Manganese				886	826	838
Nickel	8			35.5	90.5	103
Potassium				245	23.5	94.4 84.7
Sodium Variation	1		_	62.3	*	3 1
vanadum Zioc	1 8	32.8	4.56	4.7	7.51	62.6
2				5.75	19.5	223
HEAVY METALS		52		ur.	77	ţ
NOTES:		43,127	5,829	3,776	10.895	12.357

NOTES:

Only detected analytes are included on this table, for full data set see the appropriate appendix
NOAA - National Oceanographic and Atmospheric Administration Guidelines (ER-L = effects range-low; ER-M - effects range-median)
Dashes (-) indicate that no standard (e.g., MCL, SMCL, MCLG) exists or that the analyte is present below detection limits
Heavy metals include Sb,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag

Comparison of Criteria for Sediments from the Helicopter Hangar Area All Concentrations in µg/g

	On-Site Maximum	NOAA(2)	A(2)	Ontarlo(3)	10(3)	FSEDG	FSEDQUAL(4)
Metals	Concentration(1)	ER-L	ER-M	Lowest Effect	Severe Effect	Hyalella	Microtox
Aluminum	15,700	-	:	:	e 1	27,000	;
Barium	110	1	ŀ	9	33	1	1
Beryllium	1.17	1	ŀ	;	1	1	ŀ
Calcium	1,280	1	1	1	ł	i	!
Chromium	24.4	80	145	26	110	280	.!
Cobalt	14.2	;	;	50	•	;	i
Copper	12.4	70	390	16	110	840	1
Iron	20,600	;	;	2%	4%	1	1
Lead	10.6	35	110	31	250	720	260
Magnesium	3,000	:	\$	i	:	6,100	1
Manganese	32.7	:	ŀ	460	1,100	1,800	,
Nickel	15.9	30	20	16	75	1	31
Potassium	1,830	:	ŀ	;	1	!	1
Vanadium	32.8	1	ŀ	1	1	;	1
Zinc	62.5	120	270	128	820	1,100	490

Notes:

- (1) Maximum concentration detected during the SIA (1993).
- Long, E.R. and L.G. Morgan, August 1991. The Potential for Biological Effects on Sediment-Sorbed Contaminants Tested in the National Status and Trends Program. National Oceanographic and Atmospheric Administration. Seattle, WA NOS OMA 52. ER-L = Effects range low; ER-M = effects range medium. 3
 - Persuad, D., et. al., 1991. The Provincial Sediment Quality Guidelines. Water Resources Branch, Ontario Ministry of the Environment (Draft).
 - Cubbage and Breidenbach, June 1994. Creation of Freshwater Sediment Quality Database and Preliminary Analysis of Freshwater Apparent Effects Thresholds. Washington Department of Ecology. Freshwater Apparent Effects Thresholds from the model FSEDQUAL for Hyalella and Microtox. **⊕ €**

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7.0 Physical Characterization and Contaminant Assessment of the Inactive Landfill No. 2 (IL2)

7.1 Introduction and Background

The IL2 is located south of Tipton Airfield and about 450 feet north of Little Patuxent River (Figures 1-2 and 7-1). The landfill, an unlined rubble disposal facility, was used from 1952 to 1964, with some additional activity after 1970.

An SI was conducted for the IL2 in 1992 (EA Engineering, Science and Technology, 1992). During the SI, one deep and five shallow monitoring wells were installed and sampled. The shallow wells are screened in the unconfined lower Patapsco aquifer, a 30 to 35 foot thick layer of sand and gravel. The deep well is screened in the Patuxent aquifer, approximately 120 to 130 feet below grade. The confining layer, the Arundel formation, is approximately 95 feet thick.

Ground water in the lower Patapsco was found to flow south-southeast to southwest and mimics the topographic contours. A 12-foot difference in piezometric levels between MW-30S and MW-30D indicates a downward vertical gradient.

Low concentrations of VOCs, SVOCs, and pesticides were detected in ground water:

- VOCs were detected in four wells, but none of the compounds with MCLs were present above that standard.
- One well contained m-xylene (1.21 µg/L) below the MCL.
- Five wells contained detectable pesticides, but none of the compounds with MCLs were present above their standard.
- Three metals exceeded MCLs or action levels for total metals: arsenic (one well), beryllium (three wells), and lead (one well). However, no MCLs were exceeded for dissolved metals.

Two surface water samples were collected during the SI; neither surface water sample contained detectable VOCs or SVOCs, but 12 pesticides were detected. Numerous metals were detected but none was present above its MCL. However, the detection limit for both ground and surface water for beryllium (1.12 µg/L) is slightly above the MCL (1.0 µg/L).

7.2 Summary of Investigation for Study Area

The purpose of the SIA field investigation for the IL2 was to confirm the presence of previously detected metal contamination in ground water by resampling all monitoring wells in this area, and then evaluate any detected contamination in terms

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of hydraulic transport and compare the new data to the historical data. The tasks completed to achieve this objective included:

- Collection of six ground water samples. Five samples were to be collected from the water table (lower Patapsco) aquifer and one from the confined (Patuxent) aquifer.
- Collection of depth-to-water information for interpreting the hydraulic conditions.

No changes to or deviations from the original scope of work were required for this area.

7.3 Physical Characterization of the Study Area

7.3.1 General Description

The 10-acre site is covered with tall grasses and trees. Due to a fence, half of the facility is accessed through the PWRC entrance and half through Tipton Airfield. The Little Patuxent River is located within 400 feet. Drainage from two storm water outfalls, originating at the Tipton Airfield, flows in surface water channels across the site.

According to the ecological investigation, the land cover consists of woodland, scrub/shrub areas, shrub/emergent/open-water interspersed areas, and miscellaneous fill-material/brush areas. Non-tidal wetlands are located north, west, and south of the site.

7.3.2 Hydrogeology

The geologic interpretation of the aquifers at IL2, presented in the SI (EA Engineering, Science and Technology, 1992b), has not been reassessed during the SIA because there was no geologic portion of the investigation. As mentioned in Section 7.1, six wells exist at the IL2, one of which is installed in the confined Patuxent aquifer and five of which are installed in the unconfined lower Patapsco aquifer.

A complete round of depth-to-water measurements was collected on February 16, 1993. The measurements are reported along with their corresponding elevations on Table 7-1. Ground water elevations ranged from 97.64 to 93.36 feet MSL in the unconfined aquifer. Ground water is flowing radially from a ground water mound (Figure 7-2). The mound is inferred based on the topographic contours. Figure 7-2 illustrates the direction of ground water flows.

No wells are located north of the IL2, therefore the direction of flow cannot be determined for that area. Based on the topographic contours, it is not unlikely that ground water also flows radially to the north. If that is the case, there may not be a location in which an upgradient well could be installed.

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The water level elevation in Patuxent formation well MW-30D is approximately 11 feet lower than the water level in the clustered lower Patpasco formation well MW-30S, indicating a strong downward vertical gradient. The direction of flow in the confined Patuxent aquifer could not be determined because there is currently only one data point in that aquifer at IL2.

Ground water elevations and directions of flow in the SIA are comparable to the SI data. The vertical gradient was slightly stronger during the SI measurements (14 feet difference) than during the SIA measurements, but was also in a downward direction.

7.4 Nature and Extent of Contamination

During the SIA field investigation, ground water samples were collected to evaluate the nature and extent of contamination. The results of these sampling efforts are described below. The data tables presented in this section only provide a summary of the contaminants detected. A complete summary of the data can be found in Appendix K. Table 7-2 provides a complete summary of the laboratory samples collected at the IL2, including site IDs, site types, media codes, and analytical parameters.

7.4.1 Chemical Results of Ground Water Analyses

Field Parameters: During the sampling process, field measurements were made of the ground water for pH, conductivity, temperature, and turbidity. The field parameters are indicative of the general water quality, and are found in Table 7-3.

For ground water samples from the lower Patapsco aquifer, pH ranged from 4.53 to 6.62. Conductivity ranged from 0.099 to 0.827 µmhos/cm². Temperature ranged from 8.1°C to 12.4°C. The range for turbidity was from 10 to greater than 999 NTUs. None of the measurements was outside the expected range; no trends were observable.

Metals: Metals are naturally occurring in soil and are found in ground water. Metals are the primary ingredient used in the composition of many different materials such as building materials, automobiles, tanks, airplanes, etc., and in paints and pigments. For approximately 12 years the IL2 was used as a disposal facility, thus increasing the potential for elevated metals concentrations in ground water. Six ground water samples were collected and analyzed for 27 total and dissolved (filtered) metals (Table 7-3). Eight metals were not detected above the method detection limit: antimony, cadmium, molybdenum, selenium, silver, tellurium, thallium, and tin.

For total metals, chromium exceeded its MCL at MW-30S; lead exceeded its action level at MW-30S and MW-29. SMCLs for aluminum, manganese, and iron were frequently exceeded by both the total and dissolved metal concentrations.

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The metals data were also compared to the previous sampling results to determine if the concentrations were within the previous range. Three wells had metal concentrations above their previous maximum:

- At MW-29, previous maximum total (unfiltered) metal concentrations were exceeded for eight metals: beryllium, chromium, cobalt, copper, iron, lead, vanadium, and zinc. Lead exceeded its action level during February 1993.
 Previously, lead was below the standard.
- At MW-30S, previous maximum total metal concentrations were exceeded for 10 metals: aluminum, beryllium, chromium, cobalt, copper, iron, lead, nickel, vanadium, and zinc. Two metals, chromium and lead, exceeded their MCL and action level respectively. Previously only lead exceeded its action level.
- At MW-31, previous maximum total metal concentrations were exceeded for six metals: beryllium, chromium, cobalt, copper, iron, and vanadium. No MCLs were exceeded for either this or the previous data.

All of the MCL exceedences were for total metals; there were none for dissolved metals. Due to the natural presence of metals in ground water, it is often difficult to determine if detected metal concentrations are elevated due to site activities or represent background levels. At the IL2, no upgradient well exists, therefore, background metal concentrations were not established.

7.5 Contaminant Assessment

Total metal concentrations that exceed the MCLs or action level continue to be detected. In the SI (EA Engineering, Science and Technology, 1992b), two metals (arsenic and lead) exceeded their regulatory limit at one location each. In the SIA, standards were exceeded a total of five times (lead in four locations and chromium in one location). Although all of the wells are downgradient of the source area, the highest metal concentrations are found south and southeast of the IL2. The total metals are present in highest concentrations in MW-30S (451 μ g/L), MW-31 (189 μ g/L) and MW-29 (180 μ g/L). Wells MW-27 and MW-28 have lower metal concentrations and are probably less influenced by source chemistry. The distribution of two metals that exceeded standards is illustrated in Figure 7-3.

The three locations at which previous maximum concentrations were exceeded, MW-29, MW-30S, and MW-31, are all downgradient of the source area. Given the location and increased number of MCL exceedences, it is not unlikely that an increased number and mass of metals are migrating from the source. However, it is also possible that the results reflect seasonal or natural variability.

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Migration of metals in the dissolved state is unlikely to be a problem because all dissolved metals were present below their standards.

7.6 Data Gaps and Recommendations

During the SIA at the IL2, the direction of ground water flow remained consistent with previous reports. The total metals concentrations continue to exceed MCLs in several downgradient wells; however, no dissolved metal exceeds its MCL. Metal contamination may potentially be flowing onto the BRAC parcel and into the Little Patuxent River. Several data gaps have been identified, including questions raised about the cause for the observed increase in metals contamination, the extent of contaminant migration, and the hydraulic connection between the ground water in this area and the river. The USAEC is conducting a RI at the IL2 which will include a detailed evaluation of site conditions. Workplans for that effort are expected to be released in October 1995 and detail the sampling and analysis program for the site.

	Data Gaps	Proposed Action	Rationale
1.	It is unclear if contaminant concentrations are increasing or reflect natural/seasonal variability.	 Collect ground water samples on a quarterly basis for one year. Analyze samples for total and dissolved metals. 	The data should provide a sufficient database to evaluate contaminant trends and fluctuations.
2.	It is unknown if VOCs, previous detected in MW-30D, are consistently present.	Sample all wells for VOCs; if no VOCs are detected during the first quarter, eliminate analyses for remaining quarters.	Provide a better basis for including or excluding VOCs from future monitoring and determine if the VOCs at MW-30D are consistently present.
3.	The metals contamination on site may be migrating toward the river either south or southeast of the landfill; both directions may result in contamination flowing from the base onto the BRAC parcel.	 Install two monitoring wells downgradient (one south and one southeast) of the landfill. Collect continuous split-spoon samples in both borings to evaluate the presence of layers that may hydraulically isolate the river from the ground water. 	Chemical data from the new wells will be used to evaluate if elevated site metals are migrating further downgradient toward the river; ground water data from adjacent to the river may also be used for the river pathway in the risk assessment.
4.	The hydraulic connection between the ground water and the river is unknown.	 Install chart recorders for measuring water levels in the new monitoring well adjacent to the river and in a stilling well installed in the river. Measure water levels weekly for one year. 	The relative elevations between the monitoring well and the river will indicate if the river is gaining or losing water to the ground water system. The one year database will provide sufficient data to indicate if the interaction between the river and the ground water varies seasonally.

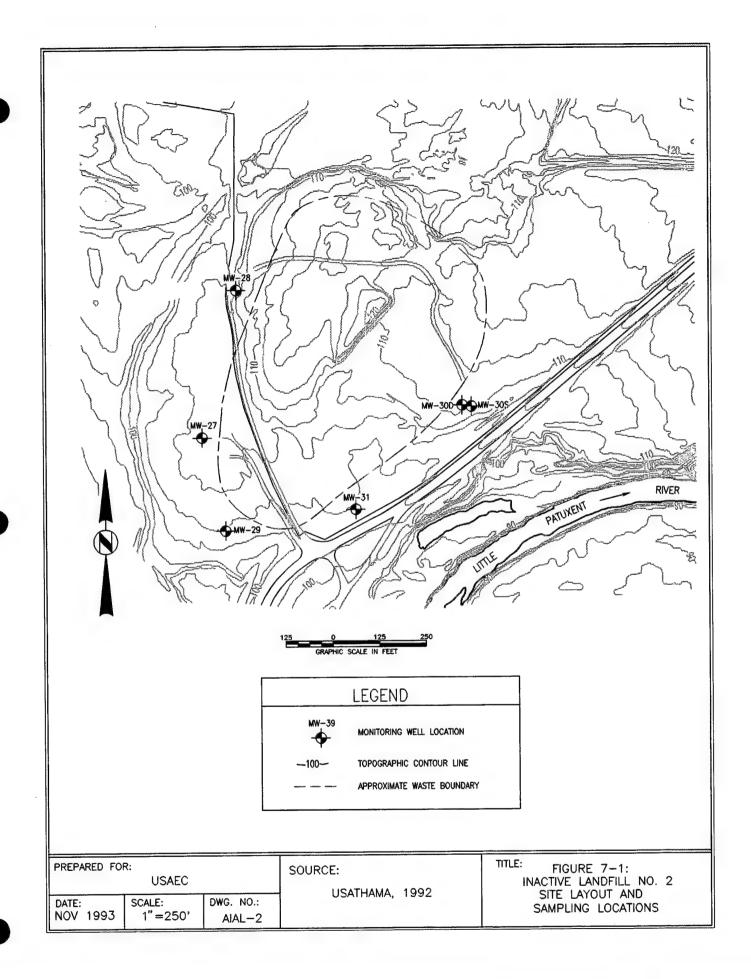
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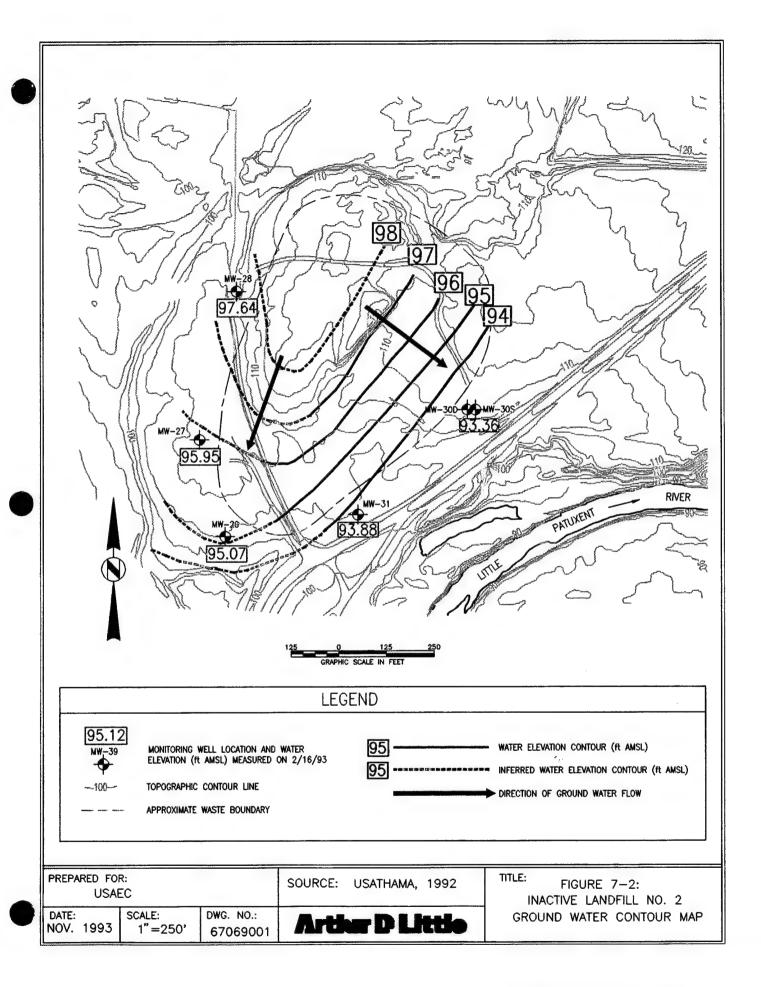
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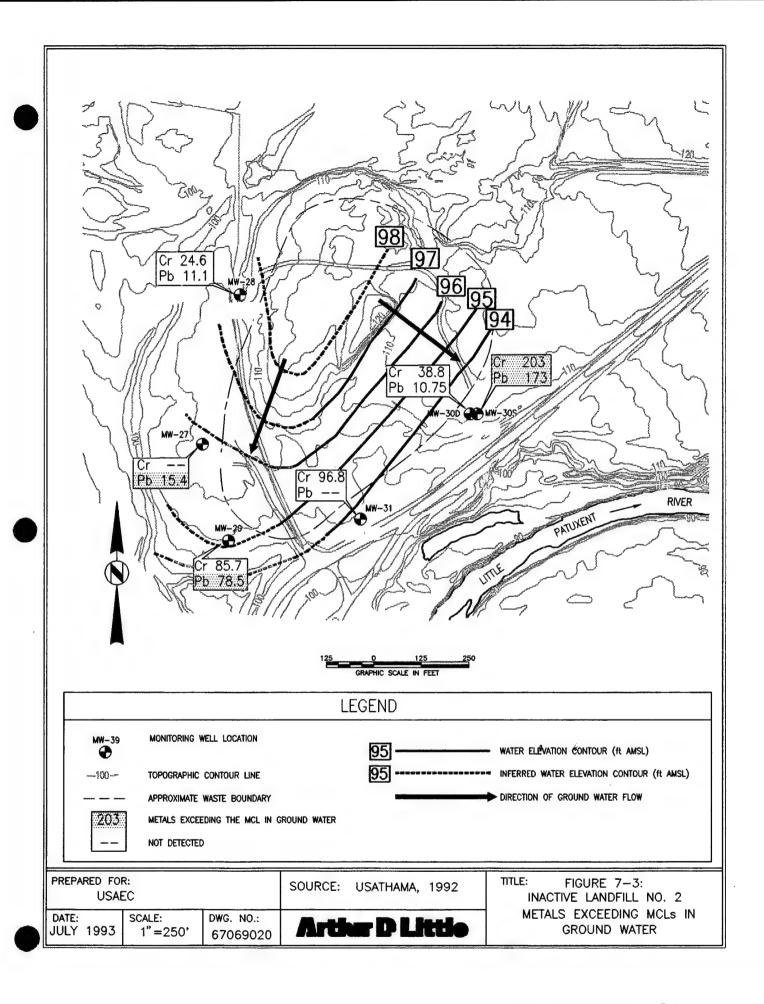
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	Data Gaps	Proposed Action	Rationale
5.	Ground water flow direction north of the IL2 is unknown.	 Install up to three monitoring wells north of the IL2 (northwest, north, northeast). Analyze samples for total and dissolved metals and VOCs. 	The data will indicate if ground water contamination is flowing to the north; if the new data indicates that ground water does not flow northward, the wells can be used to establish background metals concentrations.
6.	UXO may be present in the subsurface.	Conduct UXO clearance for all new sampling points.	UXO present a safety concern that requires both downhole and surface clearances.
7.	Hydraulic conductivity is unknown.	Conduct hydraulic conductivity tests in two new wells, MW-30S, MW-30D and MW-29.	Hydraulic conductivity data are necessary for determining ground water flow velocities and contaminant transport; the MW-30 cluster is included since there is no previous data for these wells, and MW-29 is included for comparison against previous data.
8.	Location/elevation data are needed for the interpretation of hydrologic conditions.	Survey in the new wells.	Location data are needed for data entry into IRDMIS. Elevation data are needed for interpretation of ground water elevation data.
9.	A record of decision (ROD) maybe needed for site completion.	Conduct Ecological and Human Health Risk Assessment (additional surficial soil samples may be required for the risk assessments). Complete a Feasibility Study and Proposed Plan.	Additional tasks are required for a ROD.







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Table 7-1: Ground Water Elevation Data for the Inactive Landfill No. 2

1960 1960		Date:	2/16/93
Site ID	MP Elevation ft MSL	DTW ft	Elevation ft MSL
MW-27	108.53	12.58	95.95
MW-28	106.70	9.06	97.64
MW-29	106.18	11.11	95.07
MW-30S	112.11	18.75	93.36
MW-30D	112.25	29.99	82.26
MW-31	106.59	12.71	93.88

Notes:

MSL - mean sea level

MP - measuring point (notched or marked PVC) unless noted otherwise in the field logs

DTW - depth-to-water from the measuring point

Table 7-2 Summary of Laboratory Samples for the Inactive Landfill No. 2 - As Collected Fort George G. Meade, Site Inspection Addendum

Arthur D Little

TYPE OF SAMPLE	SE	FIELD	DATE SITE TYPE	SITE	MEDI	₹ E	рертн	TCL SVOCs	TCL VOCs	PHC	TAL	TAL	TCLP ORG/ MET	PCB	EXP	<u>ਹ</u>	NO3 T	s son	SO4 PEST	ST
Background Solls	BKG-10 BKG-11 BKG-12	BKG-10 B1A0010 BKG-11 B1A0011 BKG-12 B1A0012	012893 012893 012893	A HOL	888	zzz	0-0.5 FT 0-0.5 FT 0-0.5 FT	000	000	000	000		000	000	000	000	000	000	000	
GROUND WATER INVESTIGATION	INVESTIG/	NOLLY																		.
Ground Water	MW-27	11M0027	021793	WELL	CGW	ш	9	0	0	0	-	-	0	0	0	0	0	0		•
Samples	MW-28	11MOO28	021793	WELL	% 0 0 0 0 0	шц	<u> </u>	00	00	00	* *		00	00	00	00	00	00	0 0	00
	MW-30S	11M030S	021793	WELL	CGW	ш	<u> </u>	0	0	0	- 4		0	0	0	0	0			. 0
	MW-30D	11MO30D	021793	WELL	SGW CGW	ш	Ϋ́	0	0	0	-	-	0	0	0	0	0			0
	MW-31	11MO031	021793	WELL	SGW	ш	9	0	0	0	-	-	0	0	0	0	0			0
Collocates	93QC-45 Q1XD ² (dup of MW-30D)	93QC-45 Q1XD451 (dup of MW-30D)	021793	WELL	MSO	ш	¥	0	0	0	-	-	0	0	0	0	0	0	0	0
Field Blanks	93QC-15	93QC-15 Q1XF150	021793	FBLK	CSW	z	0	0	0	0	0	-	0	0	0	0	0	0	0	0
Rinse Blanks	93QC-25	99QC-25 Q1XR250	021793	RNSW	CSW	z	0	0	0	0	0	-	0	0	0	0	0	0	0	0

NOTES:

(1) indicates if sample location is new (N) or existing (E) IRDMIS Site Type Codes: WELL-water, AHOL-auger hole

FBLK-field blank, RNSW-rinse water RDMIS Media Codes: CGW-chemical ground water, CSO-schemical soil CSW-chemical surface water.

Depths for ground water samples: UP-upper Patapsoo, LP-lower Patapsoo, PX-Paturent, ND-not determined or unclear NA - not applicable

TCL, VOCa - Volatile Organics, Target Compound List
TCL, SVOCa - Serrivolatile Organics, Target Compound List
PHC - Petroleum hydrocarbons
TAL FMET - Fitered metals, Target Analyte List

TAL UMET - Untillened metals, Target Analyte List
ORGAMET - organics/metals

UNIONE I - organicalmetais EXP - Explosives TDS - Total Dissolved Solids

PEST - Pesticides

TABLE 7-3: Field and Metals Data for Ground Water From the Inactive Landfill Number 2 Page 1 of 2

Fleid Sample ID Site Type Screen Start Depth (It bgs) Screen End Depth (It bgs) Media			MW-27 HM00277 WELL 15 30 CCW Total	HM0027Z HM0027Z WELL 15 30 30 30 CGW	11M0028Y WELL 72+ 22+ 22+ 74- 74- 74- 74- 74-	1100282 1100282 WELL 12+ 22+ CGW	MW-29 HIMOG29Y WELL 10 26 CGW	MW-29 HM00252 WELL 10 10 10 10 10 10 10 10 10 10 10 10 10	MW-30D HM030DY WELL 120 130 130 130	HW-30D HM030DZ WELL WELL 120 130 CGW
Collection Date QC Type			17-Feb-93	17-Feb-93	17-Feb-93	17-Feb-93	17-Feb-93	17-Feb-93	17-Feb-93	Uissoived 17-Feb-93
FIELD PARAMETERS										
Conductivity (umhos/cm2)			0.161		0.143		6.41 0.827		0.107	
Temperature (C) Turbidity (NTU)			12.4		10.4 4.99		8.4		13.3	
METALS (ug/L)	MCL	SMCLs/ MCLGs								
Aluminum	1	50-200 S	481	ı	3,490	1	19,900	1	2.790	271
Arsenic	ន	1	000	1	7.56	:	12	6.6	ì	1
Beckling	% 00, 0,	ت و	20.8	46.9	84.8	62.1	480	300	105	8
Boron	- 1		1 1	۱ ۱	<u> </u>	; ;	4 8 8	176	1./5	ŧ
Calcium	1		18,300	18,500	13,500	12,900	102,000	95.700	33.100	100,67
Chromium	\$	5	1	1	24.6		85.7		38.8	18
Copper	1300		1 1	1 1	33.1	: :	8 £	20.8	ı	1
uozi	1	300	22,600	12,300	25,800	366	132,000	43.800	25.900	806
Lead	5	ı	15.4	1	1.1	1	78.5	1	10.7	1
Mandanese	1 1	ر ا کی ا	05/,4 089	4,710 685	5,540	4,890 316	17,700	15,900	357	I
Mercury	2	ა თ	3 1	3 1	\$ 1	0 1	0.512	7 200	8	1 1
Nickel	5	5	1	1	!	;	1	1	1	1
Potassium	i	1	2,610	2,500	3,620	2,890	15,600	14,000	24,000	62,300
Vapadirm	1 1	1 1	2,230	062,2	4,760 ABA	4,440	2,650	5,460	26,400	72,000
Zinc	1	S 000'S	31.3	1	32.9	1 1	- 1	1 1	388 4.53	1 1
TOTAL HEAVY METALS (1)			2	c	44	•	SE	Ş	2	9
TOTAL METALS			54 727	40.000	27 000		300	2		2

NOTES:

Only detected analytes are included on this table, for full data set see appropriate appendix
Heavy Metals include Sb, As, Be, Cd, Cr, Pb, Hg, Ni, Se, Ag
Lead has an action level of 15 ug/L and copper has an action level of 1300 ug/L
MCLs = maximum contaminant levels; S = secondary MCLs (SMCLs); G = MCL goals (MCLG)
Dashes indicate that no standard (e.g. MCL or SMC/L/MCLG) exists or that the analyte is present below detection limits
Pluses (+) indicate that the depth is based on total depth measurement assuming a 10-ft screen and a 2.5-ft stick-up (no well log available)
Asterisks (*) indicate analytes present above primary standards (e.g., MCL, maximum AWCC)

TABLE 7-3: Field and Metals Data for Ground Water From the Inactive Landfill Number 2 Page 2 of 2

Sample Location Identification Field Sample ID Field Sample ID Screen Start Depth (It bgs) Screen End Depth (It bgs) Media Media Collection Date Oct Type			930C-451 Q1MD451Y WELL 120 120 130 CSW Total 17Feb-93 Dup of M1	930C-451 C1MD451Z WELL 120 130 C3W Dlssolved 17Feb-93 W-30D	HW-30S HM030SY WELL 15 15 CGW CGW Total 17-Feb-93	MW-30S H M030SZ WELL 15 15 OCOW Dissolved 17,Feb-93	MW-31 IMM0031Y WELL 125 275 CGW TOMI 174-eb-93	MW-31 IM60231Z WELL T.5 Z7.5 Z7.9 CGW Dissolved 177-et-93	
FIELD PARAMETERS pH Conductivity (umhos/cm2) Temperature (C) Turbidity (NTU)					6.2 0.233 11.8 >999		6.62 0.099 11.2 >999		
METALS (ug/L)	MCL	SMCLs/ MCLGs							
Aluminum		50-200 S	1,610	357	24,800	1	8,360	1	
Austria Bartum Bartum	2,000,	5 (1 6 6	366	5.73 588 7.73	65.6	6.3 8.3 8.3	89.1	
Bons	4	<u>ဖ</u>	1.41	1	3.89	1	3.7	1 6	
Cakium	1 1	1 1	148,000	157,000	36,800	30,300	147,000	44.000 44.000	
Cobalt	8	უ 	38.1	26.7	500 800 800 800 800 800 800 800 800 800	1 1	96.8 8.68	1 1	
Copper	1,300	1,000 G/S	1	ł	198	1	76.3	1	
Lead	1 15		14,800 5,43	1 1	46,000 173 173	5,440	98,200	18,000	
Magnesium	1		162	t	7,830	5,920	26,800	25,700	
manganese Mercury	1 00	გ ¹	28.1	1 1	1,910	1,270	2,2 2,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1,0 1	1,950	
Nickel	8	5	ı	1	62.5	1	1	1	
Potassium	1	1	105.00 20.00 20.00	13,000	0506	5,250	15,800 00,000	14,700	
Vanadium	1 1	1 1	306	200/001	24.2	000'6	88.	20.'0	
Zinc	1	s 000's	1	47.7	282	1	64.8	ı	
SUBTOTAL METALS (1)			45	27	451	0	189	8	
GRAND TOTAL METALS			400,075	400,827	231,433	51,546	309,780	215,023	

Only detected analytes are included on this table, for full data set see appropriate appendix
Heavy Metals include Sb, As, Be, Cd, Cr, Pb, Hg, Ni, Se, Ag
Lead has an action level of 15 ug/L and copper has an action level of 1300 ug/L
MCLs = maximum contaminant levels; S = secondary MCLs (SMCLs); G = MCL goals (MCLG)
Dashes inclicate that no standard (e.g. MCL or SMCL/MCLG) exists or that the analyte is present below detection limits
Pluses (+) indicate that the depth is based on total depth measurement assuming a 10-ft screen and a 2.5-ft stick-up (no well log available)
Asterisks (*) indicate analytes present above primary standards (e.g., MCL, maximum AWCC)

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8.0 Physical Characterization and Contaminant Assessment of the Ordnance Demolition Area Site (ODA)

8.1 Introduction and Background

The ODA is located at Training Range 16, in the PWRC, in the southwestern area of the Base Closure parcel (Figures 1-2 and 8-1). The facility is used for demolition of obsolete ordnance.

Two different ordnance disposal methods are practiced at FGGM: above ground and below ground detonation. Detonation is completed by counter charging the ordnance with explosives, typically C-4. Three to five mortar rounds are stacked in the pit, explosive charges are placed on the rounds. and the entire assembly is detonated. Below ground detonation is conducted by placing the mortar and explosive charges in the pit and burying the entire assembly 2 to 6 feet prior to detonation. Below ground disposal requires treatment of the ordnance filler (water, dirt, sand) prior to disposal. Treatment is done by laying the ordnance out in a pit, placing explosive at certain locations, and detonating the entire assembly. The explosive limit on ordnance exploded on the surface at the ODA is five pounds of explosives, including the necessary amount of material to fulminate the round.

During the 1992 SI (EA Engineering, Science and Technology, 1992), two surface soil samples, labeled SS-27 and SS-28, were collected from the center of the detonation area at a depth of approximately 0.5 feet below the surface and analyzed for explosives and nitrate/nitrite. One sample, SS-28, contained 1.71 μ g/g of RDX. The second sample had no detectable RDX. The precise locations of these samples within the ordnance detonation area could not be accurately pinpointed as this area has never been surveyed.

8.2 Summary of Investigation for Study Area

The objectives of the SIA field investigation at the ODA were to (1) determine if ordnance demolition may have resulted in soil contamination outside of the detonation area or with depth; and (2) determine if site activities have resulted in ground water contamination. The tasks proposed to achieve these objectives included:

- Completion of down-hole surveys for UXO during drilling for new monitoring wells
- Collection and analysis of 12 soil samples from 4 soil borings (3 depths from each)
- Completion of three soil borings as monitoring wells in the water table aquifer
- Collection and analysis of three shallow ground water samples

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During field activities, several changes were made. Each of the changes was based on discussions with and approved by the USAEC geologist and COR:

- Due to the shallow water table throughout the site, the screened intervals in each
 monitoring well and bentonite seal and grout thickness deviated from the
 dimensions specified in the Geotechnical Requirements (USATHAMA, 1987).
- The proposed soil boring within the detonation pit was hand augered due to the
 threat of UXO from previous ordnance demolition in this area. Only two soil
 samples were collected at this location instead of the proposed three soil samples
 because the hardness of the ground limited the depth to which hand augering
 could be conducted.
- The originally proposed locations for the monitoring wells, as reported in the Draft Work Plan (Arthur D. Little, 1993), were altered upon observations made in the field regarding optimal placement of the monitoring wells and the relative safety of the investigation areas.
- The original scope of work did not include analysis of explosives in the ground water; however, the COR approved the additional analyses.

The wells were arranged so that one well would be located upgradient and two wells would be located downgradient of the ordnance detonation area. All three wells were installed to evaluate the potential for soil and ground water contamination resulting from ordnance disposal and determine the direction of ground water flow.

Eleven of the 12 proposed soil samples were collected. Three soil samples were collected from each of the borings completed as monitoring wells (ODAMW-1, ODAMW-2, and ODAMW-3). Due to health and safety considerations, the soil boring proposed within the bermed detonation area was hand augered by a contractor specializing in explosives handling, EHSI.

A total of three ground water samples, one from each of the newly installed ground water monitoring wells, was collected.

8.3 Physical Characterization of the Study Area

8.3.1 General Description

The area in which ordnance demolition is conducted is approximately 20 feet by 40 feet and surrounded by berms consisting of rubble material such as concrete chunks that stand 8 feet high. The entire site is surrounded by a second ring of earthen

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berms. Shrapnel fragments and UXO were found in the open areas within the berm and in the surrounding woodland.

During the 1993 SIA UXO survey of the ODA, EHSI personnel laid out eight search lines approximately 100 feet each. Using electronic sensing equipment, EHSI personnel were able to detect UXO and other metallic objects. A total of 75 contacts were identified and removed. The items encountered included: 25 Stokes mortars flashtubes, 10 base detonating, 2 noses, 8 canisters, seven 74mm projectile rounds, one 105mm mechanical time fuze, 1 base fuze, 4 nose fuzes, three 40mm grenades, 1 adapter ring for a 155mm projectile and numerous pieces of fragments, 1 MK 26 hand grenade (remotely removed), and an M 112 block of C-4 (plastic explosive).

According to the ecological investigation (EA Engineering, Science and Technology, 1992b), land cover in the area is emergent grass with surrounding forest cover. Woodlands surround the site on the north, south, and west sides and wet meadows are located along the southeast and northwest border. A stream flows southward behind the eastern berm. According to the SI, the stream flows partially underground for a short distance and reappears as a seep.

A second, seasonal seep is located along the southern boundary, inside the outermost berm. The seep flows southwest along a drainage ditch, through a gap in the berm, and into a small stream. This seep was flowing during January 1993 but was observed to be dry during summer and fall visits.

8.3.2 Geology

The geographic location of this area suggests that the geology and hydrogeology in this area are similar to that described for the IL2. The geotechnical samples obtained from three soil borings (completed as wells) confirm that the property is located on the lower section of the Patapsco Formation. The soil borings were advanced to depths between 15 and 16 feet. The soils collected at ODAMW-2 and ODAMW-3 identify the soil as light brown, poorly sorted fine- to medium-grained sand. At ODAMW-2, the last 4 inches of the final split spoon showed a change in the lithology to light gray clayey silt. Observations made of the split spoons collected at ODAMW-1 indicate the similar lithology; however, the soil progressed to well sorted, fine-grained, sandy silt.

8.3.3 Hydrogeology

The lower Patapsco acts as the unconfined surficial aquifer at the ODA. The hydrogeologic field investigation of this aquifer at the ODA included the installation of three monitoring wells and collection of water level data.

A complete round of depth-to-water measurements was collected on February 24, 1993. The measurements are reported along with their corresponding elevations on

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Table 8-1. A ground water contour map was derived from this round of measurements (Figure 8-2) indicating ground water flow is to the southwest. Ground water elevations ranged from 90.42 to 92.27 feet MSL. The locations of the wells with the highest and lowest water levels are 250 feet apart. The average ground water gradient across the site is 7×10^{-3} ft/ft.

8.4 Nature and Extent of Contamination

During the SIA field investigation, soil and ground water samples were collected to evaluate the nature and extent of contamination present that could potentially have an impact upon the BRAC parcel. The results of these sampling efforts are described below. The data tables presented in this section provide a summary of the contamination found. A complete summary of the data for each sample can be found in Appendix L. Table 4-2 provides a complete summary of the laboratory samples collected at the ODA, including site IDs, site types, media codes, and analytical parameters.

8.4.1 Soil

A total of 11 soil samples were collected from four soil borings advanced at the ODA during the SIA. The soil samples were analyzed for total metals and explosives.

Explosives: Soil samples were analyzed for nine explosives; none were detected above the detection limit (Table 8-3). Previously, RDX was detected in one surface soil sample collected from within the bermed area; however, the concentration of RDX detected during the SI (EA Engineering, Science and Technology, 1992b) did not exceed the health advisory.

The presence of explosives in soil at the ODA is not unexpected, given the historical use of this area for the demolition of ordnance. The absence of explosives in the soil samples collected during the SIA and their (explosives) presence during the SI is a function of the type of soil and environmental variables. Explosives concentrations are expected to be greater in the shallow soil where ordnance detonation has occurred. Explosive contamination tends to be localized, as it is relatively immobile in soil; thus, deeper soil contamination is not likely to exist unless an extremely large round is detonated.

Metals: Metals commonly associated with explosives include lead, copper, and compounds used in electroplating and pigments. Lead azide is a primary explosive produced by the reaction of sodium azide and lead salt (Sax and Lewis, 1987). Ammunition is frequently made with lead. Copper is an excellent conductor, thus it is often used in electrical wiring and in switches (Sax and Lewis, 1987). Copper and

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zinc are used for brass shell casings. Soil samples were analyzed for 27 metals, of which eight were not detected (antimony, beryllium, cadmium, molybdenum, selenium, silver, tellurium, and thallium). Total metals concentration and a heavy metal subtotal concentration are provided with the data on Table 8-3.

The ODA soil metals data were compared against the background soil data to evaluate if metal concentrations are elevated at the ODA due to historical demolition activities. The comparison was conducted by construction frequency distribution diagrams for the combined data sets (see Section 3.3 for method discussion). Several metals were used for the comparison: copper, lead, and zinc were plotted because the metals are indicative of demolition activities. Chromium is also plotted as a comparison with the other metals.

- Copper. The frequency distribution plot for copper, Figure 8-3, indicates that copper is not present at FGGM in a single lognormal distribution. The lower 70 percent of the distribution lies on an approximately straight line, but the upper 30 percent deviates from that line. The upper 30 percent of the distribution comprise the twelve highest concentrations, of which four are from the ODA, three are from the DSY, and two are from the CFD. The significance for the ODA is that three of the four shallow soils collected from the soil borings lie above the lognormal distribution and therefore likely represent elevated concentrations. The highest copper concentration was detected in the shallow soil sample collected from the center of the demolition area and is higher than all other concentrations (47.1 μg/g at ODASB-4A versus the next highest concentration of 23.6 μg/g at BKG-18 from the DSY). Elevated copper levels at the ODA are supported by the fact that at each of the ODA soil borings, copper was present at its highest concentration at the surface and decreased with depth. The vertical distribution of copper is indicative of a surface impact source.
- Lead. Most of the lead concentrations at FGGM fall on an approximately straight line, with the exception of the shallow soil sample collected in the center of the demolition area (Figure 8-3). Lead is present at ODASB-4A at a concentration significantly higher then all other soil samples collected during the RIA (260 μg/g at ODASB-4A versus the next high concentration of 13.5 μg/g at BKG-10 from the IL2). Lead, like copper, has a consistent vertical distribution of contaminants with the highest concentration found in the shallow sample and the lowest in the deepest sample.
- Zinc. Zinc concentrations generally fall on a straight line with the exception of two points (Figure 8-4). Shallow soil samples ODASB-4A and BKG-12 (from the IL2) fall above the line. Zinc also exhibits decreasing concentrations with depth at the ODA.

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 Chromium. All of the chromium concentrations fall on a straight line (Figure 8-4). All of the chromium concentrations from the ODA fall on the straight line, indicating that chromium is unlikely to be significantly elevated above background at the ODA. The three background samples collected from the ODA (BKG-1, -2 and -3) have chromium concentrations (7.7 to 13.6 μg/g) that fall within the range of samples collected from the soil borings (5.31 to 19.6 μg/g).

In summary, elevated metals, consistent with metals associated with ordnance, are present in soils at the ODA. This is supported by the frequency distribution plots of specific metals and the consistency with which the metals concentrations decrease with depth. The total heavy metals sums also shows a general decrease with depth, with the exception of ODAMW-3, where the 0 to 2 and 5 to 7 feet samples have similar concentrations. The decrease with depth is most pronounced at ODASB-4, located in the center of the demolition area, in which 18 of the 19 metals detected decrease in concentration from the shallow to the deeper sample. The source area also has the highest concentration of metals for 14 of the 19 detected metals. In general, metals show a consistent pattern of decreasing concentrations with depth and away from the source.

8.4.2 Ground Water

A total of three ground water samples were collected. The samples were analyzed for VOCs, SVOCs, explosives, and total and dissolved metals. A summary of the chemical analysis including site IDs, site types, media codes, and analytical parameters is included in Table 8-2.

Field Parameters: During the sampling process, field measurements were made of the ground water for pH, conductivity, temperature, and turbidity. The field parameters are indicative of the general water quality, and are found in Table 8-4.

For ground water samples from the lower Patapsco aquifer, the pH ranged from 4.19 to 4.71. Conductivity ranged from 0.059 to 0.112 µmhos/cm². Temperature ranged from 7.2°C to 8.9°C. The range for turbidity was from below the detection limit to 436. None of the measurements was outside of the expected range although the pH was slightly lower than ground water from other areas of FGGM.

Volatile Organic Compounds: VOCs that may be encountered at the ODA would include those used to abet heat transfer and VOCs found in solvents used as metal degreasers and cleaners. Ground water samples were analyzed for 41 VOCs, of which two halogenated organics were detected; they are summarized on Table 8-5 along with their respective MCLs.

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PCE and TCE were the two halogenated organics detected. The greatest concentration of VOCs was $12.6 \mu g/L$ at ODAMW-3 (Figure 8-5).

PCE is the only compound present exceeding its MCL. The MCL is exceeded at two locations, ODAMW-1 and ODAMW-3. The greatest concentration was found in the monitoring well located upgradient of the detonation pit (ODAMW-3). The location of the second MCL exceedence is downgradient of the detonation pit. Figure 8-5 illustrates the distribution of the detected VOCs.

Semivolatile Organic Compounds: SVOCs are used in plastics, which are frequently used in military explosives. Ground water was analyzed for 116 SVOCs, but none were detected (Table 8-5).

Explosives: Ground water samples were analyzed for nine explosives, of which three were detected and are summarized on Table 8-4, along with their respective Health Advisory (HA) limits. At present, there are no MCLs or SMCLs for the three compounds identified.

The explosives detected included HMX, RDX, and 2,4-dinitrotoluene (DNT). HMX and RDX are typically utilized in military plastic explosives, such as the C4 used at the ODA to dispose of ordnance. These compounds were detected in the ground water samples collected at two of the three monitoring wells (ODAMW-1 and ODAMW-2). The maximum concentration of explosives measured was 93.74 μ g/L. The total explosives concentration in the second sample found to contain explosives was much lower, 37.67 μ g/L. The HA of 2 μ g/L for RDX was exceeded at both of the locations at which it was detected, whereas the HA for HMX was not. There are no regulatory standards reported for DNT in ground water.

The two wells in which explosives were found are located downgradient of the ordnance disposal area. Figure 8-3 illustrates the location of explosive contamination. Explosives are transported from the soil into the ground water due to soil permeability, solubility of contaminant, adsorption properties of the soil, and rain water infiltration. The shallow depth to ground water and the solubility of explosives increase the rate of contaminant migration. The relative leachability of explosives, is as follows (highest to lowest): RDX, TNT, 2,4-DNT, 2,6-DNT, HMX, and Tetryl (USAEC, 1993). The soils present at the ODA consist of primarily sands, which are highly permeable, and exhibit poor adsorption, thus increasing the likelihood of contaminants in the soil migrating downward to ground water. The two methods typically used to dispose of ordnance further contribute to its presence in ground water as energy produced from the explosion drives shrapnel and explosive materials downward.

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Metals: Metals are often used in the composition of explosives (lead azide), in the construction of casings and projectiles (iron, aluminum, copper, zinc), and are used to aid in the detonation of explosives (copper switches), therefore it could be expected to find metals in the ground water, especially given the sandy soils present at the ODA. Ground water samples were analyzed for 27 metals, both total and dissolved analysis. Eleven metals were not detected: antimony, boron, cobalt, mercury, molybdenum, nickel, selenium, silver, tellurium, thallium, and tin. Metals that were detected are summarized on Table 8-2, along with their associated MCLs. It should be noted that the method detection limits for three metals, antimony, cadmium, and thallium, are greater than their MCLs, making it impossible to determine if MCLs have been exceeded for one or more locations.

No MCL exceedences were observed, except for cadmium at ODAMW-1. Cadmium is used in paints and as an alloy for electroplating.

At every monitoring well sampling location, the SMCLs for aluminum, iron, and manganese were exceeded in the sample analyzed for total metals. Also at every monitoring well location, the SMCLs for aluminum and manganese were exceeded in the samples analyzed for dissolved metals.

As discussed in Section 8.4.1, it appears that ordnance demolition has resulted in elevated metal concentrations in soil. The soil contamination extends spacially to all of the monitoring wells. Based on the soil investigation, it is not unlikely that metals concentration may be elevated in ground water. However, without an unimpacted, upgradient well, background metal concentrations cannot be determined. Therefore, it is difficult to determine if the metals present in ground water are due to site activities or are naturally occurring. Although explosive compounds have migrated into ground water, the metals may be sufficiently less mobile to limit downward migration, which causes ground water contamination.

8.5 Contaminant Assessment

Secondary explosives continue to be detected at the ODA; however, the matrices in which they were found are different. During the SI (EA Engineering, Science and Technology, 1992b), low levels of RDX were detected in the surface soil collected from within the ordnance detonation pit. During the 1993 SIA, explosives were not present in the soil samples; however, three explosive compounds (RDX, HMX, and DNT) were detected in the ground water at two locations downgradient of the detonation pit. The presence of explosives in these wells indicates that demolition activity in the source area is contributing to ground water contamination and that the contamination is moving toward the south in the direction of ground water flow.

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Soil data indicate that metals are elevated in surface and subsurface soils. The metal distribution (the highest metal concentrations are in shallow soils and close to the source) is consistent with site use and support the likelihood of metals being elevated above background levels.

VOC contamination was detected at each sampling location; however, MCLs were exceeded by PCE in three locations and TCE in one location. The upgradient well, ODAMW-3, had the highest concentration of both PCE and TCE. VOC concentrations in ground water decreased from the upgradient well to the downgradient wells. The source of the VOC contamination is unclear but may be located in the northeast corner of the property.

8.6 Data Gaps and Recommendations

The SIA investigation confirmed the presence of contamination that was previously suspected. Contamination was suspected based on historical and present site use.

The SIA investigations determined the direction of ground water flow to be toward the southwest. Explosives and VOCs were detected in the ground water; metals are probably elevated in soils. Several data gaps were identified during this investigation, including the source and extent of the VOC contamination and the extent of explosive contamination in ground water. The following actions have been proposed to address the data gaps. The USAEC is conducting a RI at the ODA which will include a detailed evaluation of site conditions. Workplans for that effort are expected to be released in May 1995 and detail the sampling and analysis program for the site.

Data Gaps	Proposed Action	Rationale
The source of the VOC contamination, and both the source and extent of the explosive contamination, are unknown.	 Screen ground water shallow samples for VOCs using a field GC. Screen approximately 10 ground water samples for explosives using an immuno assay technique. Install a maximum of 4 monitoring wells downgradient of the known contamination; well locations will be based on the results of the field screening program, however, one of the wells will be placed adjacent to where the surface drainage enters the stream. 	 The field screening data will be used to locate the extent of the plume, to aid in well placement, and limit the necessary number of permanent wells. The cross-gradient wells will help delineate the plume to the east and the west. The downgradient wells will be used to determine if the contamination is flowing off site.

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	Data Gaps	Proposed Action	Rationale
lo an th	here is currently no well cated upgradient of the rea affected by VOCs; herefore background water uality is unknown.	 Install one upgradient well based on results of the field screening. 	Determine background ground water quality.
no Oi da	fround water quality has of been confirmed at the DA; also, there are no ata to evaluate seasonal uctuations.	 Collect ground water samples from new and existing wells quarterly for one year. Analyze samples for VOCs, explosives and metals; the new locations will also be sampled for SVOCs during the first round, but if no SVOC contamination is detected, the SVOC analyses will be discontinued after the first sampling round. 	Data from the existing wells are necessary to confirm the previous results; data are needed from both the new and existing wells to define the extent of the contamination.
be	he hydraulic connection etween the stream and the round water is unknown.	 Collect continuous split-spoon samples from the well installed adjacent to the stream to evaluate the presence of the layers that may hydraulically isolate the stream from the ground water. Install a surveyed gauge in the stream. Collect stream water levels at the same time water levels are collected from the adjacent well. 	The relative elevations between the monitoring well and the stream will indicate if the stream is gaining or losing water to the ground water system.
	ontaminants may have nigrated into the stream.	Collect two surface water/ sediment sample pairs; one pair will be collected from upstream of the impacted area; one pair will be collected from immediately downstream from where the surface drainage enters the stream.	Surface water and sediment data are needed to evaluate the potential contaminant migration pathways; these data can also be used in the risk assessment.
	XO may be present in the absurface.	Conduct UXO clearance for all new sampling locations.	UXO present a safety concern that requires both downhole and surface clearances.
	he hydraulic conductivity f the aquifer is unknown.	Conduct hydraulic conductivity tests in a maximum of five wells.	Hydraulic conductivity data are necessary for determining ground water flow velocities and contaminant travel times.
	here is no surveyed site	Have surveyors create a new base map on AUTOCAD.	The relationship of the demolition area and site boundary to the sampling points needs to be better understood.

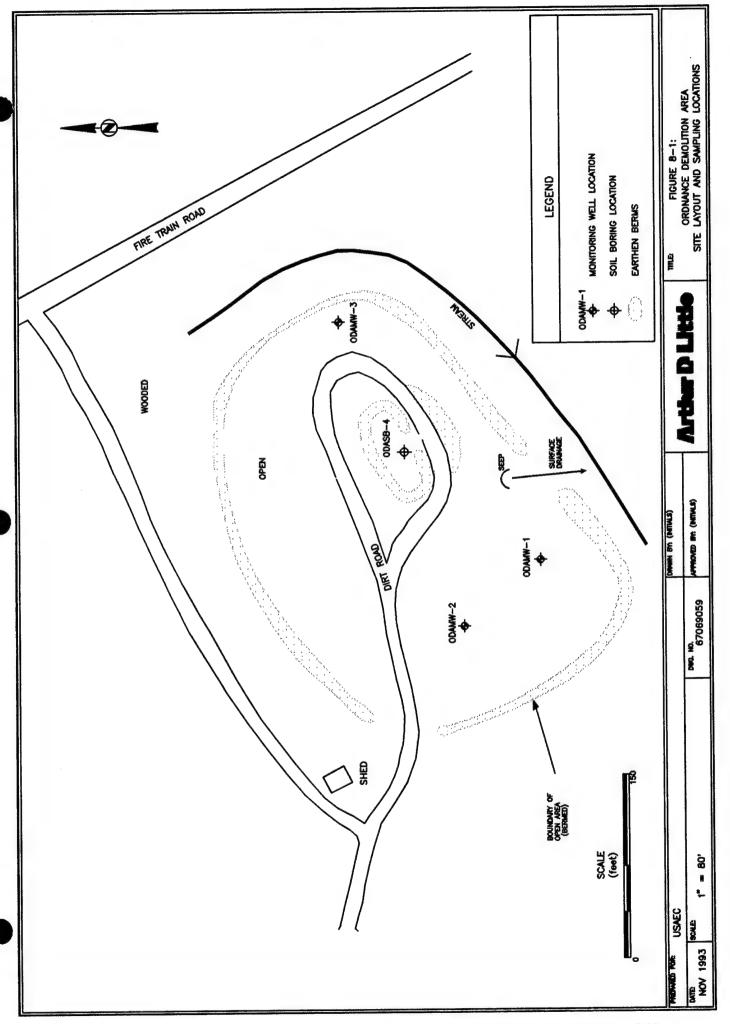
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Data Gaps	Proposed Action	Rationale
9. A Record of Decision (ROD) may be needed for site completion.	Conduct Ecological and Human Health Risk Assessments (additional surficial soil data may be needed for the risk assessments). Complete a Feasibility Study and a Proposed Plan.	Additional items are required for a ROD.



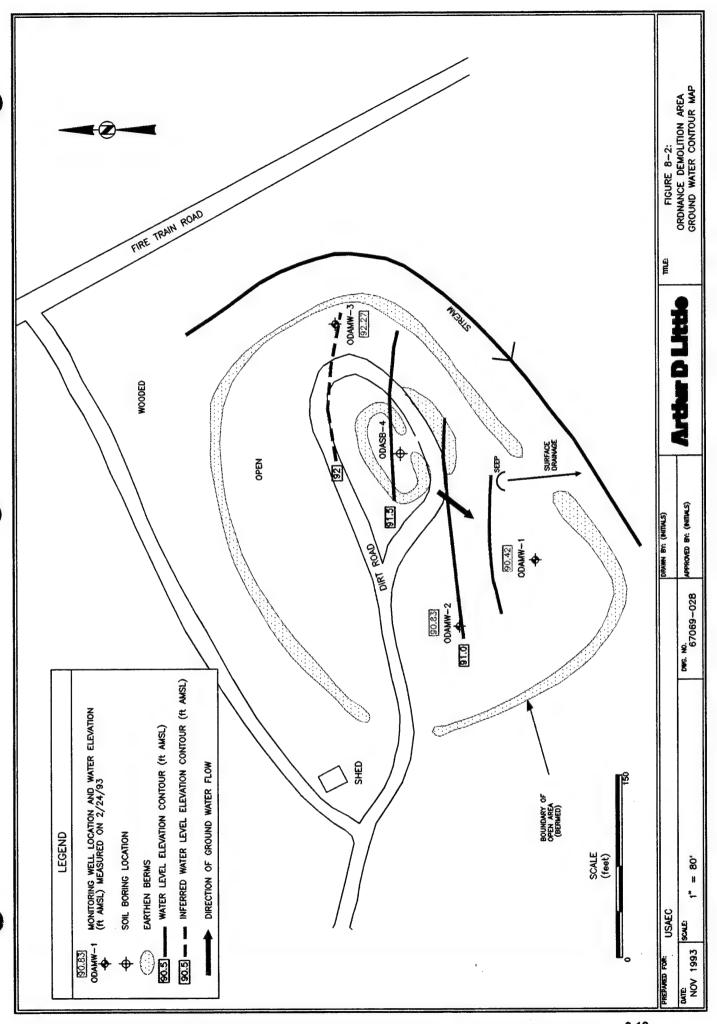
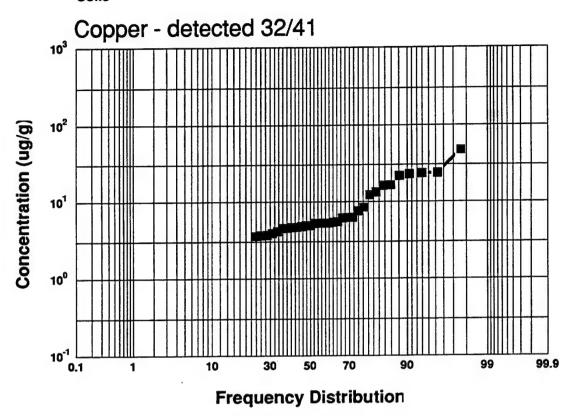


Figure 8-3: Frequency Distribution of Copper and Lead in Background and ODA Soils



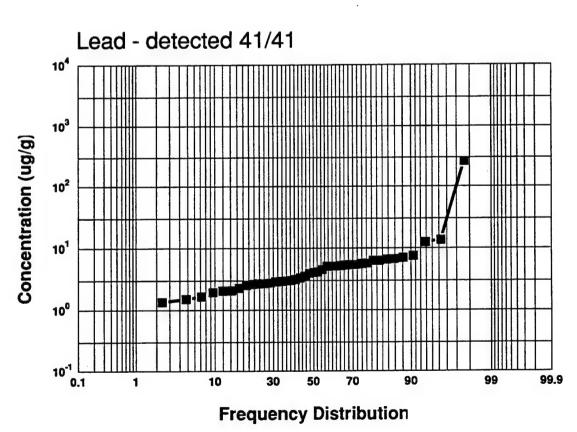
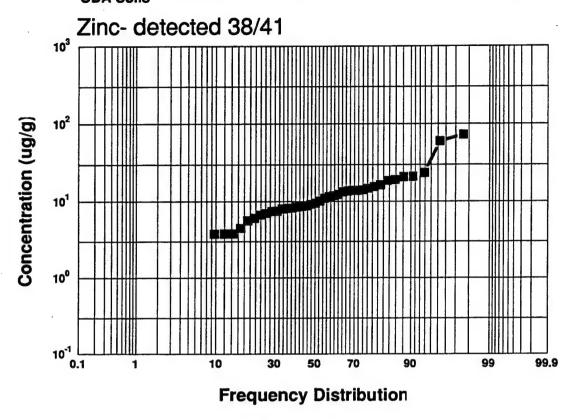
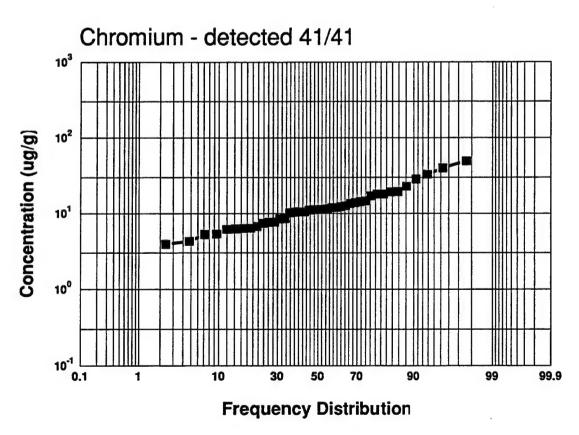
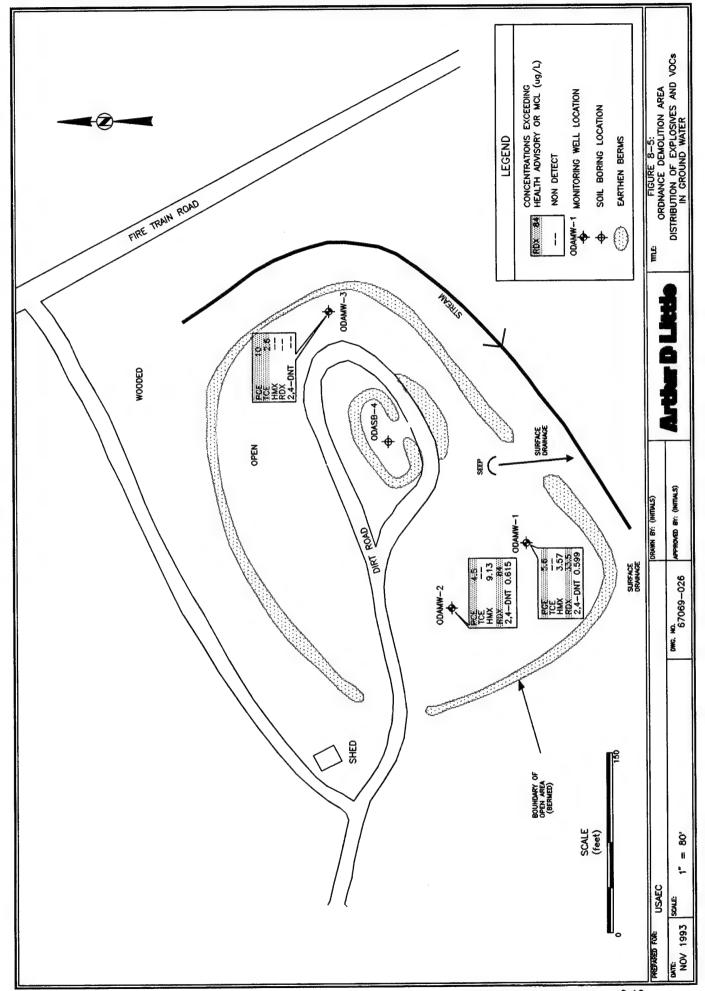


Figure 8-4: Frequency Distribution of Zinc and Chromium in Background and ODA Soils







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Date:

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Table 8-1: Ground Water Elevation Data for the Ordnance Demolition Area

and the second second			Date	: 2/24/93
Site ID	Ground Elevation	MP Elevation	DTW	Elevation
	ft MSL	ft MSL	ft	ft MSL
ODAMW-1	93.22	95.42	5.00	90.42
ODAMW-2	95.03	97.41	6.58	90.83
ODAMW-3	95.89	98.35	6.08	92.27

Notes:

MSL - mean sea level

MP - measuring point (notched or marked PVC) unless noted otherwise

DTW - depth-to-water from the measuring point

Table 8-2 Summary of Laboratory Samples for the Ordnance Demotition Area - As Collected (Page 1 of 2) Fort George G. Meade, Site Inspection Addendum

TYPE OF	SITE	FIELD	DATE		MEDIA	N S	DEPTH	ם	헏		TAL	TAL	TCLP ORG/							
SAMPLE	2	2		7	SODE	=		- 1		됐		. 1	- 1	88	EXP	ĭ Z	NO3 TDS	1	SO4 PEST	
SOIL INVESTIGATION	Z																			
Drilling	ODAMM-1		012293	BORE	080	z	0-2FT	0	0	0	0	-	0	0	-	0	0	0	0	
	ODAMM-1		012293	BOHE	SS	z	5.7 FT	0	0	0	0	-	0	0	_			0	0	
	ODAIMW-1	ODAMW-1 O1B0001C	012293	BORE	OS OS	z	10-12FT	0	0	0	0	-	0	0	-		0	0	0	
	ODAMW-2		012593	BORE	oso	z	0-2FT	0	0	0	0	-	0	0	-	•	-	•	. •	
	ODAMW-2 01B0002B		012593	BORE	SS	z	5.7 FT	0	0	0	0	-	0	0		. 0		0	0	
	ODAMW-2	ODAMW-2 O1B0002C	012593	BORE	cso	z	10-12FT	0	0	0	0	-	0	0	_	0	0	0	0	
	ODAMW-3		012693	BORE	OSO OSO	z	0-2FT	0	0	0	0	-	0	0	-	6	6	•	•	
	ODAMW-3		012693	BORE	တ္တ	z	5.7FT	0	0	0	0	-	0	0		. 0		0	· c	
	ODAMW-3	ODAMW-3 O1B0003C	012693	BORE	SS	z	10-12FT	0	0	0	0	-	0	0	-	0	0	0	0	
Hand Auger	ODASB4	O1B0004A	012693	AHOL	SS	z	0-2FT	0	0	0	0	-	c	•	-				•	
	ODASB-4	O1B0004B	012693	AHOL	cso	z	5.7 FT	0	0	0	0		0	, 0					•	
	\$28 \$2	C180004C	9	AHO.	8	2	ı	ı	1	1		1	1	1	1				, 3	00000
Background	BKG-1	B1A0001	012693	AHOL	cso	z	0-3FT	0	0	0	0	-	c	0	-			•	٠	
	BKG-2	B1A0002	012693	A-PO-	SS	z	0-3 FT	0	0	, 0	0	_	0	0	. 0			0		
	BKG-3	B1A0003	012693	A P	တ္တ	z	0-3FT	0	0	0	0	-	0	0	0		0		-	
	BKG-27	B1A0027	011894	A A	တ္တ	z	2-3FT	0	0	0	0	-	0	0	0	0			-	
	BKG-28	B1A0028	011894	A HOL	တ္တ	z	2-3FT	0	0	0	0	-	0	0	0	0			-	
Field Blanks		Q1XF100	012293	FBLK	CSW	z	0	0	0	0	0		0	0	-	0	0	C	c	
		Q1XF101	012593	服	CSW	z	0	0	0	0	0	-	0	0	. 🖵				•	
	99QC-102	Q1XF102	012693	FBLK	CSW	z	0	0	0	0	0	-	0	0	· -		0	0	0	
Rinse Blanks	92OC-200 01XR200	O1XR200	012293	WSW	CSW	z	c	c	c	•	c	•	c	•	,		•	•	•	
	920C-201 Q1XR201		012593	RINSW	CSW	z	. 0				o c			.					0 0	
	92OC-202	٠.	012693	RNSW	CSW	z	0	0	0	0	0	-	. 0	. 0		00	0	0	0	
																			,	

Table 8-2 Summary of Laboratory Samples for the Ordnance Demolition Area - As Collected (Page 2 of 2) Fort George G. Meade, Site inspection Addendum

TYPE OF SAMPLE	STE	FIELD 10	DATE	SITE TYPE	MEDIA	ž E	ОЕРТН	TCL SVOCs	75 00 00 00 00 00 00 00 00 00 00 00 00 00	꿆	TAL FMET	TAL	TCLP ORG/ MET	BCB BCB	EXP	ರ	NO3 TDS SO4	82	Š	PEST
GROUND WATER INVESTIGATION	INVESTIGA	NOLL																		
Ground Water	ODAMW.	ODAMW-1 O1M0001	022693	WELL	CGW	z	Q.	-	-	0	-	-	0	0	•	0	0	0	0	0
Samples	ODAMW.	2 O1M0002	022493	WELL	SGW	z	2	-	-	0	-	-	0	0		0	0	0	0	0
	ODAMW	3 O1M0003	022693	WELL	CGW	z	Ş	-	-	0	-	-	0	0	**	0	0	0	0	0
Field Blanks	93OC-15	30C-154 Q1XF154	022693	FBLK	CSW	z	¥	-	-	0	-	-	0	0	+	0	0	0	0	0
Rinse Blanks	930C-25	89QC-254 Q1XR254	022693	RINSW	CSW	z	ş	-	-	0	-	-	0	0	*	0	0	0	0	0

FBLK-field blank, RNSW-stree water, BORE-borehole (1) Indicates if semple location is new (N) or existing (E) IRDMS Site Type Codes: WELL-water, AHOL-suger hide

IRDMS Media Codes: CGW-chemical ground water, CSO-chemical aci CSW-chemical eurlace water

Dephe to ground water semplos: UP-upper Patapaco, LP-dower Patapaco, PX-Patavent, ND-not determined or undeer

Shaded areas indicate changes from the original SOW

NA - not applicable

TCL, SVOCs - Semivolatile Organics, Terget Compound List TCL, VOCs - Volatile Organics, Target Compound List PHC - Petroleum hydrocarbons

TAL FMET - Fibred metals, Target Analyte List TAL UMET - Unifitered metals, Target Analyte List ORGANET - organiculmetals EXP - Explosives

TDS - Total Dissolved Solids PEST - Pesticides

TABLE 8-3: Explosives and Metals Data for Soll from the Ordnance Demolition Area Page 1 of 1 $\,$

She Type Start Depth (fl. bgs) End Depth (fl. bgs) Media Coalithmotved Collection Date OC Type	O180001A BORE CSO CSO Total	Districts BORE 5 CSO Total Zalens	Oregonic BORE 10 12 CSO Total 25-Jan 93	CSO CSO CSO CSO CSO CSO CSO CSO CSO CSO	O180002B BOHE BOHE CSO Total 23-Jan-83	DI BOOGG BORE 10 12 CSO Total 25-lan-83	Origonia ROHE CSIO Zalanda	CSO Total	D1800032 BCHE 10 12 CSO 7044 7044	CSO CSO AS FAMILES	POHE BORE
EXPLOSIVES (ug/g)	9	Q	Q	9	Ð	9	9	9	9	Q	QN
METALS (ug/g)											
Aluminum	2990	5110	1290	9860	0909	1910	6920	6430	2780	6820	2750
Barium	9.74	16.8	5.64	21.1	. 6. 6.6.	5.34	39.8	16.4	8.1 4.24	8. 6.	8.78 6.93 5.53
Calcium	115	699	90	150	. 8 6	0.5.	157	31.2	14.9	75.7	9.49
Chromium	12	11.4	6.77	14.7	10.5	5.31	19.6	4	7.45	19.4	12.1
Copper	21.7	6.16	1 6	5.28	1 2 4	: :	; 4	; tt	. 4 54	4.38	1 20
lron	9780	3990	4510	7410	2002	3200	8110	10400	4770	12700	8850
pee	5.15	2.98	1.68	5.73	2.29	1.52	5,47	3.32	5.09	560	2.77
Magnesium	200	8	28.3	445	355	28.8	337	182	6.69	2830	85.7
Mercury	B; ;	: :	1 1	2 :	6.9	: :	31 :	: :	: :	<u>स</u>	
ckel	:	:	1	:	:	:	:	: 1	: :	3 =	1
Potassium	211	416	ı	902	420	:	5	467	171	851	122
Sodium	1	1	1	:	:	:	1	:	:	132	1
-	: :	: 5	1 5	: :	: !	: !	;	:	:	98.3	ı
Vanadium Zinc	2,5	13.6 6.74	<u> </u>	12.2	6.12	11.7	19.8	22.3 4.51	14.4	22.7	2,5 2,5 1,5 1,5 1,5 1,5 1,5 1,5 1,5 1,5 1,5 1
HEAVY METALS	8	4	6	7.6	ç	7	×	8	;	ě	2
TOTAL METALS	12252	2000	0793	10507	77077	- 0020	3 65	2 2	1 00	2000	*

NOTES: Heavy menals includes Sb, As, Be, Cd, Cr, Pb, Hg, Ni, Se, Ag Bashes includes that no standard evisits (e.g., NKL) or SMCLAMCLG) or that the analyte is present below detection limits Only detected analytes are included on this table, for full data set see appropriate appendix ND indicates that no compounds were detected in this class

TABLE 8-4: Field Screening, Explosives and Metals Data for Ground Water from the Ordnance Demolition Area Page 1 of 1

Streen Start Depth (it bys) Screen Start Depth (it bys) Media Total Dissolved Collection Date OC Type		COW TOW 13.5 13.6 COW Total	ODAMW: OT MOOT 2 WELL 3.5 13.5 CSW DSWOOD 2	ODAMW 2 01 MODOZY WELL A CSW Total	ODANW2 01MO002Z WELL F CGW Dissolved	ODSANWA DINGOGSY WELL B COSW COSW Total	ODANW3 DIMOGSZ WELL S 5 16 CSW Dissoctived
FIELD PARAMETERS					C-1-10-1-7	28-407-83	28-Fab-93
pH Conductivity(umhos/am2) Temperature(C) Turbidity(NTU)		4.69 0.112 7.3		4.19 0.108 7.2		4.71 0.059	
EXPLOSIVES (ug/L)	HA	999		0		8.9 436	
HMX RDX 2,4-Dinitrotaluene	400	3.57		9.13		:	
METALS (ug/L)	MCL SMCL/MCLG	6600		0.615		: :	
Aluminum Arsenic	- 50-200 S	1,970	8	,			
Barium		2.77	3 : 6	4.64 4.64	505	9,720	117
Caldum	g : :	7.45	• 10.6	\$:	88.1	88.7	58.2
Copper	1300 - G	024'/ 	9,520	6,480	8,170	2,040	1 970
Lead	88	8,960	11	30.4	11	25.4	1
Manganese	1 1	3787	1 60	6.54	: :	34,000	1 1
Potassium	 S	218	272	4,310 243	5,070	3,090	2.680
Silver	S2 5	1,630	2,150	2,550	1,690	163 2030	138
Sodium	::	3.150	: 50	: :	: :	:	8 1
Zinc	1 1	3 1	3,490	2,340 82	3,480	2,460	2.480
Total Heavy Metals	90'5	76.6	601	66.4	49.8	61.9 45.9	36.2
Total Metals		10 27.303	6 93 66	9	0	2	3
NOTES:			066,05	57,870	19,337	2 2 2 2	0

NOTES:
Heavy Metals Include Sb,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag
Lead has an action level of 15 ug/L and copper has an action level of 1300 ug/L
MCLs = maximum contaminant levels; S = secondary MCLs (SMCLs); G = MCL goals (MCLG); HA = health advisory (explosives only)
Dashes indicate that no standard exities or that the analyte is present below detection limits
Asterisks (?) indicate analytes present above primary standards (e.g., MCL, maximum AWCC)
Only detected analytes are included on this table, for full data set see appropriate appendix

Table 8-5: Organic Compounds in Ground Water from the Ordnance Demolition Area

Sample Location Identification Field Sample ID Site Type Screen Start Depth (ft bgs) Screen End Depth (ft bgs) Media Total/Dissolved Collection Date QC Type				ODAMW-1 O1M0001 WELL 3.5 13.5 CGW Total 26-Feb-93	ODAMW-2 O1M002 WELL 4 14 CGW Total 24-Feb-93	ODAMW-3 O1M0003 WELL 5 15 CGW Total 26-Feb-93
VOLATILE ORGANIC COMPOUNDS (ug/L)	MCL SM	CLMCLG				
HALOGENATED VOCs				·		
Trichloroethene	5	0	G	_	_	2.6
Tetrachloroethene	5	0		5.6 *	4.5	10 •
Total VOC				6	5	13
SEMIVOLATILE ORGANIC COMPOUNDS				ND	ND	ND

NOTES:

MCLs = maximum contaminant levels; S = secondary MCLs (SMCLs); G = MCL goals (MCLG)

Dashes indicate that no standard exists (e.g. MCL or SMCL/MCLG) or that the analyte is present below detection limits

Only detected analytes are included on this table, for full data set see appropriate appendix

ND indicates that no compounds were detected in this class

Asterisks (*) indicate analytes present above primary standards (e.g., MCL, maximum AWQC)

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9.0 Soldiers Lake

9.1 Introduction and Background

Soldiers Lake, now called Allen Lake, is located on the BRAC parcel approximately one-mile west of the ASL. The man-made lake is approximately 20 acres in size and up to 12 feet in depth.

Soldiers Lake is located in the Little Patuxent Watershed. The lake is fed by the Range Harbor Branch which is formed, north of Route 32, by the confluence of the Midway and Franklin Branches of the Little Patuxent River. The rivers flow southward while draining the majority of the base north of Route 32. The Franklin Branch flows through Burba Lake prior to reaching its confluence.

The outflow from Soldiers Lake flows south and is joined by an unnamed tributary that flows through and adjacent to the ASL. The combined flow joins the Little Patuxent River outside the boundary of the BRAC parcel.

Surface water and sediment samples were collected from Soldiers Lake during the SI (EA Engineering, Science and Technology, 1992b). Two locations were sampled, one in the central area of the lake and one near the southern discharge. The surface water samples were found to contain low levels of pesticides (the maximum concentration for an individual pesticide was 0.041 µg/L for heptachlor), but no VOC or SVOCs. Eight metals were detected in both surface water samples but none were detected above their AWQC. Three metals, cadmium, chromium, and copper, had detection limits slightly above the AWQC, but the gap between the detection limits and AWQC was less than 7 µg/L.

USAEC-certified methods were used as the basis of the analytical work for this program. The precision and accuracy of these methods is determined over a four-day period with the preparation and analysis of standard matrix-spiked samples. The concentration spiked versus the concentration found for the QC spikes are plotted and the certified reporting limit (CRL) is statistically calculated. The CRLs of the USAEC-certified methods for DataChem Laboratories for cadmium, chromium, and copper are given in the table below. The corresponding MCLs and AWQCs are also listed.

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Metal	CRL (μg/L)	MCL (μg/L)	AWQC (μg/L)
Cadmium	6.78	5	1.1
Chromium	16.8	100	210
Copper	18.8	1300	12

The scope of work for this SIA was to evaluate human health risk, therefore, the MCLs were used to determine the acceptability of the laboratory's detection limits. Although the cadmium CRL is above the MCL by 1.78 μ g/L, it was accepted after reviewing the Soldiers' Lake Sediment Inorganic Data (EA Engineering, Science, and Technology, Inc., January 1992) that found < 1.2 μ g/g of cadmium in the sediment, which is below ER-L standard for cadmium in sediment of 5 μ g/g. If cadmium was present in the lake water, it would have evidenced itself in elevated sediment concentrations.

Pesticides (maximum detected concentration was $0.30~\mu g/g$ of chlordane) were also detected in sediments. No VOCs were detected in either sample but two SVOCs (fluoranthene and pyrene) were detected in the southern sample. Seventeen metals were detected. Metal concentrations were higher in the northern sample than in the southern sample.

9.2 Summary of Investigation for Study Area

The purpose of the SIA field investigation for Soldiers Lake was to confirm the presence of previously detected analytes in surface water by resampling in this area. The chemistry is compared to the historic data. The tasks conducted to achieve this objective included:

· Collection of two surface water samples.

Table 9-1 summarizes the laboratory samples collected at Soldiers Lake including site IDs, site types, media codes, and analytical parameters. Figure 9-1 illustrates the sample locations and site layout.

9.3 Physical Characterization of the Study Area

Soldiers Lake is located in a wooded area of the BRAC parcel. The banks of the lake are generally grassy. The lake is surrounded by access roads with a small spillway at the southern end. A bridge crosses the spillway.

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The lake is divided into two sections by a strip of land near sample location SLSW-1. The land constricts lake flow into a channel which is approximately 50 feet wide. Approximately 5-inches of ice were present in this area during the sampling. The area by the spillway was not frozen and had a total depth of approximately 2 feet.

9.4 Nature and Extent of Contamination

During the SIA, surface water samples were collected to evaluate changes in water chemistry from the previous sampling round. The resulting data are discussed below. The data tables in this section provide a summary of the detected analytes. A complete summary of the data can be found in Appendix M.

Field Screening Readings: During the sampling process, field measurement were made of the surface water for pH, conductivity, temperature and turbidity. The field parameters are indicative of general water quality and are included in Table 9-2. For surface water, pH ranged from 5.83 to 6.54. Conductivity ranged from 0.342 to 0.716 µmhos/cm². Temperature ranged from -1.0 to 3.7° C. Turbidity ranged from 8 to 16 NTUs. None of the measurements were outside of the expected range; no trends were observed.

Metals: Metals are naturally occurring elements and are commonly found in ground and surface water. The surface water samples were analyzed for 27 metals, of which 9 were detected: aluminum, barium, calcium, iron, potassium, manganese, magnesium, sodium, and zinc. The detected metals are summarized on Table 9-2. Zinc is the only one of the detected metals with an AWQC. Zinc concentrations in the samples were below both the continuous and maximum AWQC.

The same nine metals were detected in surface water during the SI sampling round. In both data sets, higher concentrations of metals are generally found in the sample collected by the spillway. Seven metals were detected at higher concentrations in the SIA, but only one concentrations increased by more than 50 percent. Sodium tripled from SI to the SIA maximum concentrations. In the winter, when road salt is commonly used, sodium concentrations often increase in surface water. The increase of sodium in Soldiers Lake most likely reflect that the SI samples were collected in April and the SIA samples were collected in January.

Pesticides: Low concentrations of pesticides have been detected in the past in multiple media and locations at FGGM, therefore, the surface water samples were analyzed for pesticides. The samples were analyzed for 18 pesticides of which three were detected: isodrin, lindane and PPDDT. The highest individual concentration was

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 $0.008~\mu g/L$ of lindane in sample SLSW-1. Total pesticide concentrations range from $0.011~\mu g/L$ to $0.017~\mu g/L$.

During the SI, seven pesticides were detected with a maximum individual concentration of $0.041~\mu g/L$ of heptachlor in SW-23. The total pesticide concentration for the SI (EA Engineering, Science and Technology, 1992b) was $0.113~\mu g/L$, approximately an order of magnitude higher than the total pesticide concentration in the SIA. The data may indicate that the pesticide concentrations have decreased between 1991 and 1994 or that the pesticide concentrations change seasonally dependent upon pesticide use.

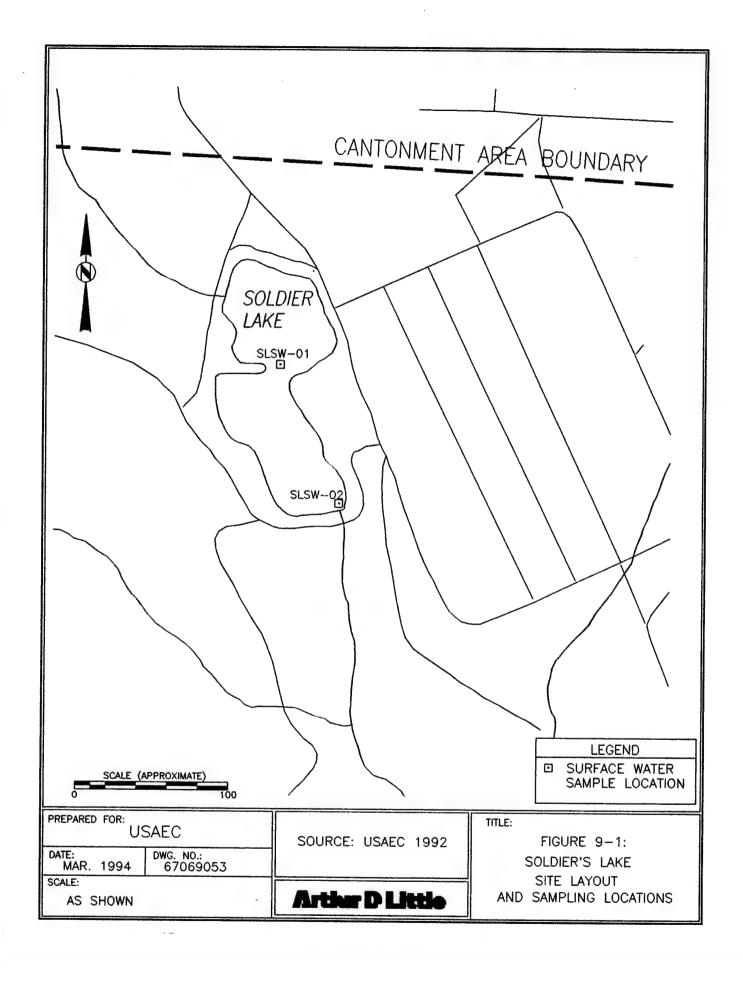
9.5 Contaminant Assessment

In general, the data collected in the SIA were in agreement with the SI data. The same metals were detected at generally comparable concentrations. No AWQC were exceeded by the detected metals, therefore, it is unlikely that the metal concentrations have an detrimental impact on lake ecology.

The pesticide concentrations may have decreased slightly, however, changes in chemistry may be attributed to seasonal variations. The pesticide concentrations are typical of those detected in other media at FGGM.

9.6 Data Gaps and Recommendations

Based on historical and recent data, no future action is proposed for this area.



67069/SLCOLL.WQ1

Table 9-1 Summary of Laboratory Samples for Soldler's Lake - As Collected Fort George G. Meade, Site Inspection Addendum

TYPE OF SAMPLE	SITE 10	FIELD 10	DATE	SITE	MEDIA	N/E	DEPTH	TCL SVOC	TCL VOCs	F	TAL	TAL	ORG/ MET	PCB EXP CI NO3 TDS SO4 PE	ΔX	z z	8 T	SC SC	A PES
Background Solls	BKG-24 BKG-25	B1A0024 B1A0025	011994	AHOL	85 85	zz	2.3FT 2.3FT	00	00	00	00		00	00	00	00			
	BKG-26	B1A0026	011994	AHOL.	CSO	z	2-3FT	0	0	0	0	-	0	0	0	0	0	0	
SURFACE WATER INVESTIGATION	NVESTIGATION SISW.1	7	8	1 AKG	800	2	ž	ć	c	•	•	•	•	•	•	·			,
Samples	SLSW-2	S1K0002	011894	Z W	CSW	z	§ §	• •	• •	0				. •					
Duplicates	94QC-455 (dup of SLSW-2)	Q1KD455	011894	LAKE	CSW	z	ž	0	0	0	-	-	•	0	0	0	0		-
Field Blanks	940C-158	Q1XF158	011894	FBLK	CSW	z	ş	0	0	0	0	-	0	0	0	0	0		-

NOTES:

NE indicates if sample location is new (N) or existing (E)
IRDMIS Site Type Codes: WELL_water, AHCL_auger hole, STRM-stream
OTFL_outial, LAKE-lake, FBLK-field blank, RNSW-winse water
RDMIS Media Codes: CGW-chemical ground water, CSC-chemical soil
CSW-dremical surface water, CSE-chemical sediment
Depths for ground water samples: UP-upper Patapaco, LP-lower Patapaco,
PX-Patuvant, MD-not determined or unclear; NA-not applicable

TCL, VDCe - Volatile Organics, Target Compound List TCL, SVCCe - Serrivolatile Organics, Target Compound List

PHC - Petroleum hydrocarbons
TAL FMET - Filtered metals, Target Avalyte List
TAL UMET - Unfiltered metals, Target Analyte List
ORGAMET - organics/metals

EXP - Explosives

TDS - Total Dissolved Soilds PEST - Pesticides

9-6

TABLE 9-2: Metals and Pesticides in Surface Water from Soldiers Lake Page 1 of 1

Site ID Field Sample ID Site Type Start Depth (ft) End Depth (ft) Modia Collection Date Total/Dissolved QC Type			SLSW-1 S1K0001Y LAKE 0 0.5 CSW 19-Jan-94 Total	SLSW-2 S1K0002Y LAKE 0 0.5 CSW 18-Jan-94 Total	940C-455 Q1KD455Y LAKE 0 0.5 CSW 18-Jan-94 Total Dup, of SLSW-2
FIELD PARAMETERS pH Conductivity (umho/cm2) Temperature (C) Turbicity (NTU)			6.54 0.716 -1.0 8	5.83 0.342 3.7 16	
METALS (ug/L) Aluminum Barium Calcium Iron Magnesium Manganese Potassium Sodium Zinc HEAVY METALS TOTAL METALS	AWQC MAX 	CONT	119 68 22,800 502 5,150 120 3,610 93,000 32.9 0 125,402	143 58.1 19,600 498 4,360 114 3,320 44,900 25.9 0 73,019	152 58.5 19,200 501 4,330 112 2,560 43,300 29 0 70,243
PESTICIDES (ug/L) Lindane Isodrin p.p'-DDT TOTAL PESTICIDES	- - -	- - -	0.008 0.003 - 0.011	0.006 0.006 0.005 0.017	0.006 0.005 0.004 0.015

NOTES:
Only detected analytes are included on this table, for full data set see the appropriate appendix
AWQC - ambient water quality criteria, MAX - maximum, CONT - continuous
Dashes (--) indicate that no standard (e.g., MCL, SMCL, MCLG) exists or that the analyte is present below detection limits
Heavy metals include Sb,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag

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Date:

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Appendix A: DPDO Salvage Yard and Transformer Storage Field Forms (DPDO currently known as DRMO)

DPDO Salvage Yard and Transformer Storage Soil Boring and Monitoring Well Installation Logs (DPDO currently known as DRMO) Appendix A-1:

n	rtlur I) Littl	e	S	oil Bo	ring Log Client US AEC Project P7. MEADE Case No. 67069	
Date	Start 1	12717	>	Contra	ctor A	T O CO A PRINCIPLE	
Date	Complet					De la codina Albanda	wit
	Diamete		 	Type O	f Rig M	BILE DRILL B-57 DISPOSAL YARD	
				Drilling	Additive	es NONE DAW-ZOO	
Rori	ng Denth			Geologi	ist o. A	VANGHTON RT 32	
Samu	oling Me	thod He	ND ALLE	2 012	z" x 2' s	PLIT SPOON, 140 12 HAMMER, 30" DEOP	
Janny		SAMPLE				GEOLOGIC DESCRIPTION	
Scale in Feet	Type and number	Interval	Recovery	Blows Per 6"	Total Organics (ppm)	Unified Soil Class ID, color (Munsell System), grain size, sorting, moisture, compaction, indication of contaminants (unusual odor or sheen), and general stratigraphic descripti	
-0.0							.=
		3.0-2.0	2.0'	HAND		(SM) PARELL SAND WITH EILT, MEDIUM AND SEME SAND, LOSE, MEY, WELL SORTED DARK YELLOWIGH MOUND LUYENZ	
-\$.0 -	4501		com poste	AVISTREE	0.*	0.8-2.1 WELLSOR TED MEDIUM SAND, ROUME LOOSE, DRY, LIGHT BROWN SYR 576	0
-20					1		
-					 		4
1-3.0							\dashv
7-							4
!			ļ				
-4.1							
-							٦
-5.0				<u> </u>		EM WELL SOLTED, DOVNOTO MENION	
_			2.0'	u . 00		[SW] LICHT BRIWN SYR 5/6	+
-6.0	5502	15.20	Composite	HAN	0.0	[SW] LIGHT BRIWN SYR 5/6	\dashv
V.,	.205	5.00	مارد وم اسرو)	AINT	0.0		-
- ,	Ex						
7,0							
-							
- 80							ᅱ
-						·	4
-90							-
							-
[0.0]							4
				4		[SW] WELL SORTED, SUBROUNDED MEDIUM	4
[100-120	اما	17		DRY, LIGHT BROWN SVE 5/6	
-11.0	5503	MO (650	1.3	44	1,2	y , c (o) p / c 3 7 = 3 / 2	
-	1213			56			
[7.0]							ㅓ
- 1							+
-13.0							\dashv

Soil Boring Log Continuation Page

Boring No. DPD • MW-250 Client USAEL Project FT MEADE Case No. 67069

						Case No. 67069
		SAMPLE			m 4-1	GEOLOGIC DESCRIPTION
Scale	Type			Blows	Total Organics	Unified Soil Class ID, color (Munsell System), grain size,
in	and	Interval	Recovery	Per 6"	-	sorting, moisture, compaction, indication of contaminants
Feet	number			0	(ppm)	(unusual odor or sheen), and general stratigraphic description
-13.0						-
1,,						_
 ·						
-14.0	1					-
-(1,0	İ				1	_
-				l .		
15.0						and the state of t
]	4		[SW] LIGHT BROWN SYR 576, MEDIUM SAND, WELL SORTED (NO PINES), DRY,
 		120		76		SAND, WELL SDICTED (NO PAGES), OR,
16.0	5509	15.0-17.0	1.5'	24 54 85	1.2	DE-SE -
,,,,	1215		113	34	'	
-	100	}		85		
-172						
لائ ا—ا		1	1			:
-]		
—18-°			1			_
10-					1	_
-				,		
160	į.			ļ		-
-14:0				ľ		_
-						
- 200					İ	[SW] LIGHT BROWN EYE 5/6, MEDIAM SAND, WELL SORTED (NO DINES), DRY, LOOSE -
-				3		SAND, WELL SORTED (NO PINES), DAY, LOOSE
71.0	1105	20-22	1.3	4	1	ב יש יש יש יש יש יש יש יש יש יש יש יש יש
_ <i>[</i>	5505	·	1.7	3 4 9 22	1.5	CELL VERY PALE GLANGE 10 FIR 8/2, SILT COLLY
-	1276	20-22'		22		[el] very pre elanine loye 8/2, silt with 21.2 Some five sand, moist, medium stiff -27.0
_77.0						
					i	
-						
-23.°	•					-
_,,						
-						
-24,3						-
,						•
-						
75,0						Wall of and carb
				4		[SW] LIGHT BROWN SYR 5/6, MEDIUM SAND,
-						WELL SORTED, DRY, DENSE
-76.0	6406	25-27	1.6	21	24	_
	77.4	υ,	(· V	68 75	2.4	
-	1233			75		
77.0						
— <i>V</i> 8.√						-
VV.						
-						
<u>19.0</u>			İ			-
	<u> </u>				·	Page 2 of 4

Soil Boring Log Continuation Page

Boring No. DP90 Mw-200
Client USAEC
Project FT MEADE
Case No. 67069

						Case No. 67069
		SAMPLE				GEOLOGIC DESCRIPTION
Scale in Feet	Type and number	Interval	Recovery	Blows Per 6"	Total Organics (ppm)	Unified Soil Class ID, color (Munsell System), grain size, sorting, moisture, compaction, indication of contaminants (unusual odor or sheen), and general stratigraphic description
-29.0						
_30.0 - _31.0 - _32.0	5507	30-32	1.51	3 11 58 58	2.3	[SW] PALE GRAYISH ORANGE 104/5 7/4, MEDIUM SAND, SVA-ROUNDED, WELL SORTED, DENSE, DRY
						:
-34.						-
	1315	35-37	į.8'	6 34 69 34	4,2	[SU] PALE GRAYIN ORANIE 10YR 7/Y, MEDIUM AND FINE SANDI, SUB ROUNDED, WELL SORTED, DENSE, DEY.
-39.0 -38.0 - -34.0						
		1				
-40.0 - -41.0 - -47.3	5509 1340	40-42	أهما	5 13 18	2.9	[SW] SAME AS ABOUE, MEDIUM DENSITY
- 41.•						-
- 44.						- -
_46.0						_

Soil Boring Log Continuation Page

Boring No. DPDO MW-200 Client USAEC Project FT MEADE Case No. 67069

					Case No. 67669
cale Type	SAMPLE	1	Blows Per	Total Organics	GEOLOGIC DESCRIPTION Unified Soil Class ID, color (Munsell System), grain size,
eet numbe	Interval	Recovery	6"	(ppm)	sorting, moisture, compaction, indication of contaminants (unusual odor or sheen), and general stratigraphic description
15.0 SS10 13.55	45-47	1-4'	3 18 34 53	1.4	[SW] PALE GRAYISH ORANGE 104 R 714, FINE TO MEDIUM GAND, WELL SORTED, SOB-ROOMD - TO ROUND, MEDIUM DENCITY, NO FINES, DRY.
1.0 B.0					- -
4.•					
7521	sosi	1.5'	\$ 14	0.9	(SW] PAE GRAYISH CLANGE 104R 7/4, FINE TO MEDIUM 84ND, WELL SORTED, SOM- POUND, LOC TO COLUMN STATEMENT CAND WITH
2.0		(13	13		[SM] FILT, WELL EXCEED, LOSE, MOIST
3.0					
4.0 5.0			_		
1526	55-59	1,9'	7 10 16 24	1.2	[SM] LICHT BROWN SYR 5/6, FINE SAND WITH SILT, WELL SOUTED, SVB-ROVNON - LOOSE, MOIST
g.°					· · · · · · · · · · · · · · · · · · ·
					- -
5513	60-62	1.7	822 36 68	;,4	[CL] PALE YELLOWISH GROWN INTE 6/2 / SILT WITH - CLAY AND FINE SAND, LOW LOISTURE & STIFF -

\(\sigma_1 \)	irtlur I) Littl	e	S	oil Bo	ring Log	Boring No. BSY MW20(Client USAEC Project H. Meade Case No.
Date	Start [eb.a.199	3	Contra	ctor A	etec .	LOCATION DUTY
	Complet		2/22			bllow Stem Auger	1
Hole	Diameter	r 1.14	1			bile ATV B-53	
Casi	ng Size	64		Drilling	g Additiv	es NA	MW 201
	ng Depth	39'	,	Geolog	ist M. Q.	reenwood	
					•	140 lahammerdaypoolsu"	- R4 B Z
		SAMPLE		Blows	Total	GEOLOGIC DE	
Scale in Feet	Type and number	Interval	Recovery	Per 6"	Organics (ppm)	Unified Soil Class ID, color sorting, moisture, compaction (unusual odor or sheen), and ge	(Munsell System), grain size, n, indication of contaminants meral stratigraphic description
-0.0 - -1.0	5501	15-2"	1.7	27 26 21	٥,٥	iswitight brown, well sorted in the with some gravel in the sm. pockets of betominous. Medium denos.	reduniquented send first o.6' (rounded), - like meterial, dry
2.0 ·							
5. 0							<u> </u>
_4.0							
-				i			
-5.0 - -6.0 -		5-7'	l'	4558	0.0	pop Dark yellowish a orange medium grained sand	104R 616, poorly sorted, dry, Louse compaction
-7.0							
- 81							-
- _9.J							_
10.0	_						_
- 11.0		10-12	1.6	10 12 14 12	٥.0	Jerky Derky Derky Well Forted weny fine so very pale orange loyer Sand trace clay. dru	- SI- Cuell Side I C
_12.0							

Soil Boring Log Continuation Page

Boring No. DSYMW201
Client USAEC
Project Ft. Mecle
Case No.

						Case No.
		SAMPLE			m	GEOLOGIC DESCRIPTION
Scale	Туре	I	T	Blows Per	Total Organics	Unified Soil Class ID, color (Munsell System), grain size,
in Feet	and	Interval	Recover	y 6"	_	sorting, moisture, compaction, indication of contaminants
Feet	number			, ,	(ppm)	(unusual odor or sheen), and general stratigraphic description
-13.0						_
						-
Γ.,					1	
-14.0						
L				ŀ		-
-15.0						
-13.0	550#	15-17	1.4		0.7	rsp Dark Yellowish orange loyr 6/6, Morly sured
-	3754		1.9		0. 1	" Gre to median preised send, dry, median"
_16.0				13		dense
				15		
				22		
_17.0						
				1		:
 						
						_
						-
Γ						_
19.0						
_						-
-1.						
-290	60.00				00	same as a bove with a 0.25 Lene of very pale crange love 8/z, elayery sit with
- 1	SSOS	20-22	1.6	5	0,0	very pale crange 10/1 8/2, clayer sit with
-212				6		true fine and.
				9		
-				1 '		
_22.0						
L						-
_30,0	1					
_				1	<u> </u>	-
-24D				1		
-312				1		•
-						
-350				_		0.05 very pate orange lute 8/2 well suffer sind, fine
","	5500	25-27	1.91	5	0,0	0.05 very per a are to the clave sill-with G.
- 1				7		0.5-0.8 very paleorange loyes by clayer sist with fine sand 0.8-1.1 Park yellowish orange 10 YF 6/6, well surted
_260				to		for moneds and
				39		1.1-1,4 - very pereorenge 1041 of 2 clayers 11 to the
22		ļ		,		for moneds and orenge toyrolz clayersiltwithing in-liq -very pole orenge toyrolz clayersiltwithings
_27.0						
	1					-
28.0	ſ					
0.0.0						
_						7
21.0						-
	!			1		Page 7 of 2

Soil Boring Log Continuation Page

Boring l	No. DSC	inwed
Client	USA	
Project	FT. M	FADE
Case No		

							Case No.
	Scale		SAMPLE		Diams	Total	GEOLOGIC DESCRIPTION
	in	Type	Interest	Desa	Blows Per	Total Organics	Unified Soil Class ID, color (Munsell System), grain size, sorting, moisture, compaction, indication of contaminants
	Feet	and number	Interval	Recover	y 6"	(ppm)	(unusual odor or sheen), and general stratigraphic description
7	-290						-
>	-						-
	_ 20.0			ļ			
1	_	S50	30-32	1.6'	3	O. U	Darkyellowin orange 104° 6/6, wett society fine to medium sand With a 0.3' zune of very - Pale orange 104° 6/2 clayey suit with fine sand, _
	_31.0				17		Pale orange 10 40 8/2 clayer suft with Fine sond _
١				į	3 17 28 49		Though
ı	-			Ì	V		[SP-ML] (AV)
	-5W						
1	-			}			
1	_33.0						, – –
۱	-					ł	7
ł	91.0						
							7
-	_35.0		14 15			11	perkyellowish orange love 6/6 poorly surted
ŀ		5500	35-32	1,5	0.1 6	त्र १५	a in moderan sand with a out outs of
	9 .0					16	very pale orange loyr 8/e C18yey 514 with fine
1	_			-			sand, very moist
	_3710						SP-MU DIV
	_						
l	_380						pepth to water was measured 29"
							Depth to the botton of well was
Ī	مھ						46'89'
İ							The governed interval was 36-26'
t	-						The sand filter was to 21'
ł	_2+Q.0						bentonite seal to 15.5'
ŀ	-						
ł	-						
ļ	-	ĺ					
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E	-						

Monitoring Well Design

Boring No. DPD MW-ZSA
Client USAEC
Project FT MEADE
Case No. (a 70.10.9)

						Case 110. 670 67	
			Complete 1/27/9			Casing Size 64 H.	S. AKCE
		TEL			G. NAV61	MON	
			EM AU GERL		th 60.0'		
Type	Of Rig Me	BILE PRI	1 3-57	Grout meth	12-0		
Datu	m			Developmen	t Method To	be developed	
Notes	3						
Saala	SAN	MPLE	Well Construction	on Diagram			
Scale in	Type	Total	Stratigra	phy ———	Constru	uction Specifications	
Feet	and	Organics	Annul	us		•	
	number	(ppm)	Well				
			1 1 1 1	1 1	Elevation Top	Of Casing	
			▎▝▘ ▗▝▗₹ <i>。</i>	PROTECTIVE	Elevation 1 op	Oi Casing	
				- CASING	Elevation Top	Of Riser Pipe 170.38'	
	:			(See Boring	Elevation Grou	ina Suriace	
l l			900	Log for			
_ 0.0				detail)		eyed elevations)	
					(dept	h from ground surface)	
					Tours of Confee	مرادران وجوري والعراب	رم دار ہے
1.0	550 l	0.0			Type of Surface	e Casing S'LENGTH HING sing 6 STEEL P	110
F					I.D. Surface Ca	ising 6 5.	-
-2.0					Type Of Riser 1	Pipe PYC (SCH 40)	-
				1	I.D. Riser Pipe	Pipe PYC (SCH 40)	
				1	Diameter Of P	mahala //	
-3.0				<i>/</i>	Diameter Of Bo	orenoie 7.7	
- 1					Type Of Backfi	11 GROUT	-
4.0							_
			1011		Type Of Seal B	ENTINITE CHIPS	_
_5.0			N N	<u>/</u>	Depth To Top (Of Seal 35.6'	
-5.0			0 8		Type Of Sand P	Pack	
-	5502	0.0	U			Of Sand Pack 41.0'	7
-6.0		•	/ N		•		\dashv
				<u> </u>	Type Of Screen	MACHINE SLOTTED PU	'c -
-7.0				ا نر	Slot Size . 61		
1.0					I.D. Screen 4		
-					Screened Interv	al <u>57.0 -47.0'</u>	7
-g.o						_	\dashv
_					Depth To Botton	m Of Well 57.0	4
_9.0		1		<u>/</u>			
				/	Depth To Bottor	n Of Borehole 60.0"	
				<i>/</i>	•		1
_ 10.0				ا نر			_

Λ	rtlur D L	.ittle	Monitoring Well Design (Continuation Page)			Client USAEC Project FT MEADE Case No. 67069
Scale in Feet	SAM Type and number	APLE Total Organics (ppm)	Well Construction Diagram Stratigraphy Annulus Well		Note	s and Comments
			.			
0.0 - -!(.*	450°3	1.2				-
-17.0 - -13.0	•					- - -
-14.0 - -15.0						- - - -
- (b.0 - - (7.3)	3504	1.2	GROUT			-
- -18.• - -19.•			ZISER			 - - -
	4505	1.5				,
-22.° - -23.°		·		\\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\		- - -
-24.8 -				1-1-4-		-

	Λ	rthir D L	.ittle	Mo	onitoring (Continua		_	No. DPDO mw-zoo 1 USAEC Oject F1 MEADE Case No. 67069				
	cale in eet	SAN Type and number	MPLE Total Organics (ppm)	Well Co	Well Construction Diagram Stratigraphy Annulus Well			Notes and Comments				
				V	<u>, , , , , , , , , , , , , , , , , , , </u>							
-	-24.0 - 2 5.2 -24.0 -27.0	4506	2.4									
•	-79.0 -79.0 -30.0	८५०२	2.3		ER GROUT							
	32.3 33.9 34.0 35.0 36.0	5508	4. 2	i	75 00 00 00 00 00 00 00 00 00 00 00 00 00							
F	77.0 38.0			1	SOLMO							

Arthur D Little SAMPLE			Monitoring Well Design (Continuation Page) Client USAEC Project FT MEA			Boring No. PDo-MW-200 Client USAEC Project FT MEADE Case No. 107067
Scale in Feet	Type and number	Total Organics (ppm)	Stratig	graphy————————————————————————————————————	Notes	and Comments
38.0 - 34.0 - 40.0 -	5509	2.9	· SENTONITE			
- -42.0 - -43.0 - -44.0						
- 46.0 48.0 44.0	4510	1.4	FILTER SAND			
_51.0 - -51.0 - -51.0	5511	0.9	~ 3347> (1)			

Λ	rtiur D I	.ittle	Monitoring Well Design (Continuation Page) Boring No. DPDO M Client USAEC Project FT MEAN Case No. 67064		
Scale in Feet	Type and number	MPLE Total Organics (ppm)	Well Construction Diagram Stratigraphy Annulus Well	Notes and Comments	
	number	(ppiii)			
-52~ -					
_53.0 -					
-54.÷				_	
-55.0		1.2	SAND		
- -56.0	4512				
- -57.v				-	
_5g.0			Ĭ.	-	
-592				-	
- _60.0	,			END OF BOKEHOLE	
-610	6513	1.4		- -	
-62.0					
-				-	
_					
_				<u> </u>	
				_	
				-	

Artiur D Little	Monitoring Well D	esign Client USAEC Project Ft. Made
3 (21)		Case No.
Date Start 2 2 93 Da	te Complete 2/3/93 Hole Dia	meter 65/g' Casing Size 4"
Contractor ATEC	Geologist	M.greenwood
	en Axen Boring Depth	
	ATV B-53 Grout method	
	than PVC ruser Development M	Method to be developed
Notes	-	
Scale in Type Total Organics number (ppm)	Well Construction Diagram Stratigraphy Annulus Well	Construction Specifications
number (ppm) - 0.0 - 2.0 - 3.0 - 4.0 - 5.0 - 4.0 - 7.0 - 7.0 - 9.0	(See Boring Log for detail)	Elevation Top Of Casing Elevation Top Of Riser Pipe Elevation Ground Surface (surveyed elevations) (depth from ground surface) Type of Surface Casing 5 Shinless Rel Strate LD. Surface Casing 6" Type Of Riser Pipe PVC LD. Riser Pipe 4" Diameter Of Borekole 65/8 Type Of Scal 6 Rectante Chaps Depth To Top Of Scal 15.10' Type Of Sand Pack Salaca Quarta Sad Depth To Top Of Sand Pack 21' Type Of Screen PVC Slot Size 0.010 LD. Screen 4" Screened Interval 36-26' Depth To Bottom Of Well 36
		Depth To Bottom Of Borehole 39

Boring No.D3YAW-201
Client USAEC

Scale in Feet Type and Organics (ppm) Total Organics (ppm) II.0 II.0 II.0 II.0 II.0 II.0 II.0 II.	Boring No. DS MWーン(Client USA = Case No. Project Fr. (Needs Case No.					Λrthur D Little				
11.0 - 12.0 - 13.0 - 13.0 - 14	·				Diagram y ———	[Annulus]	Well Con	Total Organics	Type and	in
- 11.0 - 12.0 - 13.0 - 14.0 - 15.0 - 16.0 -								- V.I		
-120 -130 -140 -150 -160 -170 -170 -170 -170 -170 -170 -170 -17	_)	1/1	ń			<u>_10∙0</u>
16.0 16.0	-									_11.0
16.0 16.0 18.0 18.0 18.0 18.0 18.0 18.0 18.0 18										_izo
16.0 16.0	_					15 15 15 15 15 15 15 15 15 15 15 15 15 1				- 13.0
16.0 16.0	-				1	18 K. 18				_ _u
-16.0 -16.0					Mior					- 150
-18.0 -18.0 -21.0	=									- 16.0
-19.0 -19.0 -19.0 -21.0 -21.0	=					000		·		-
	_	•				00 00				_
						UNITE OWITE				_
	_					Bent Servi				-
-21.8 CO CO CO	-					000	1			_
	=					30 00	į į			_21.0
	=					. 18				_220
-25.A						PACK PVK 10 PPC				_23.1
	_					SAND				_24.0

Λ	rthir D L	.ittle	Monitoring Well Design (Continuation Page) Boring No. DS / MW-201 Client USAGE Project Fortage Case No.				
Scale in Feet	SAM Type and number	MPLE Total Organics (ppm)	Well Construction Diagram Stratigraphy Annulus Well	Notes and Comments			
	and		PACK	0 K 4'	ine placed of from -		
-35.0 -36.0 -27.0 -38.0			CINPS SAND				

Appendix A-2: DPDO Salvage Yard and Transformer Storage Monitoring Well Development Logs

			W	ell No.	mw	200	
A-the DI tale	Monitor	ing Well	2				
Arthur D Little	Developmer	t Data Sheet	Pı	Project Fort Neede Case No. 67067			
			C				
Date Developed: 2/10/93	Developed By:	E.FRIEDEWON		LOC	ATION	١	
Depth to Water: 50.41	Total Depth:	57-5		Fence			
	EL O	HNu 28.400	m	South			
Measuring Point: do ble	1 to b an Pur riser			Salvas	.e yano	' <i>:</i>	
Notes:	MATER OR TVC TITEL					•	
			I	<u> </u>			
WELL VOLUME (* us	se appropriate values in	table for each code	letter)				
V well	Depth Screen Bottom	Depth Water		s of Water			
.66	x [(56.7 5 % -	So.41)]		well)			
	X [(
ANNULAR VOLUME	(ASSUME 30% POF	ROSITY) Depth **	Calle	ns of Water			
V annalus	Depth Screen Bottom	Bottom of Seal		nnalus)			
1.06	x [(59-5 -	(41.0)]	= /	9.61	,		
WATER TO BE REM	OVED	•				••	
Gallons of Water	Gallons of Water	Removal Total G	Gallons to	Ac	tual Gal	lons	
(well)	(annulus)	Multipier be Re	emoved		Remove	d	
[(5.9994	+ 1961)]x	= 28			130		
MEASUREMENTS				Т	ABLE		
				Well	An	nalus *	
Number			0	Vwell	dia	V annalus	
of Gallons Time Removed	pH Conductivity	Temperature Tu	rbidity	2"	6.5 7.25	0.46gal/ft 0.59gal/ft	
1136 0.0 gallons	9.3 33	13-7-85	490	0.17gal/ft	7.75	0.69gal/ft	
1206 25	5.1 .18	14 9	90		8.25	0.79gal/ft	
1237 50	5,0 .17		16		8.25	0.64gal/ft	
12 50 75	5.01 .16	14 +	57.10	4" 0.66gal/ft	10.25	1.06gal/ft	
13// 100	4.92 .153	13-8	10	0.00gal/it	12.25	1.63gal/ft	
1337 130	4.95 .148	13.9	10	6"	12.25	1.41gal/ft	
Denth to Collinsont Defe				1.5gal/ft	12.23	1.41garit	
Depth to Sediment: Befo	re After						
Type/Capacity of pump	KECK						
Pumping Rate 1-1	allows minute Rect	arge Time					
Time to Develop Well:	Start 1157 Fir	nish <u>1337</u>	Duratio	n than	18 mw		
COMMENTS (include	description of water ren	noved)					
					,	+	
124) After main	gallons. my 18. 53.45.44 Hao lev	elat 53-45 ft)	, 2-54/	esmus c	echag	k porte	
13 16 1/1/12 60-41	50.0-11	1414 50,70	. 04				
1407 Hzo Cece	वित अपना स्त	717 \$ 0,70	७९१ च				
	* Assumes 30% poros	ity for sand pack					

* rechangerate instally at fit minte. Slowed below or ff/minute after first 2-5ft.

* # forgot to account for standup-purged extra volume.

W

		Well No. now-201					
Arthur D Little	9	·····	SAEC				
With Prince	Development Data Sheet	Project For + Meade					
		Case No.					
Date Developed: 2/11/93	Developed By: E. Friedenson	LOC	CATION				
Depth to Water: 31.42	Total Depth: 41.755	1					
0^2 20.7 L	EL 3%. HNu .4PPM	1	, ,				
Measuring Point: 5/46k	North Salu	we yard 1					
Notes:		1	1				
WELL VOLUME (* us	e appropriate values in table for each code letter)						
${f V}$ well	Gall Depth Screen Bottom Depth Water	ons of Water (well)					
		(Well)	6.78				
	(ASSUME 30% POROSITY)						
/-06 V annalus		lons of Water (annalus)					
10.25		22.0					
WATER TO BE REMOVED							
Gallons of Water	Gallons of Water Removal be Removed		tual Gallons				
(well)	$\begin{array}{c c} \text{(annulus)} & \text{Multipler} \\ + & 22-0 & \text{) } 1 \times & 5 & = 1/43-9 \end{array}$		Removed 45				
	1	TABLE .					
MEASUREMENTS		Well	Annalus *				
Number		V well	dia V annalus				
of Gallons		, , , , , , , , , , , , , , , , , , , ,	6.5 0.46gal/ft				
Time Removed 0835 0.0 gallons	pH Conductivity Temperature Turbidity 6-7 . S32 /3.7 ???	2" 0.17gal/ft	7.25 0.59gal/ft				
0950 30 6-8		0.17ga#1t	7.75 0.69gal/ft 8.25 0.79gal/ft				
//32 60	8-82 -189.210 13.3 10						
1322 90	5-28 .208 14-3 10	4"	8.25 0.64gal/ft 10.25 1.06gal/ft				
-30 1802 120	5.57 ,2/0 /3.6 /0 5.68 .208 /1.9 /0	0.66gal/ft	12.25 1.63gal/ft				
1622 145	5.68 .208 11.9 10	6" 1.5gal/ft	12.25 1.41gal/ft				
Depth to Sediment: Befor	re After						
Type/Capacity of pump	KECK						
Pumping Rate 145 gallors	17hrs 37min Recharge Time 3 mohs time	d to 1 mia	ck u read				
Time to Develop Well: S	Start <u>0848</u> Finish <u>1625</u> Durati	ion <u>74n</u>	537MM				
COMMENTS (include o	lescription of water removed)	~_4					
Pumpwas shut of for t	wo fifteen minute intervals to let water recha	ge-					
water first a clarky oran	se brown. Water clear after togallows.	12 126	Les times				
	tandup -> purged extra volume. EF		73 SECS				
	* Assumes 30% porosity for sand pack						

Appendix A-3: DPDO Salvage Yard and Transformer Storage Monitoring Well Sampling Logs

		1 24	•.		73.0	Well No.	LIE-1	
Arthur D	I ittle	IVI	Monitoring Well Sampling					
AND PROPERTY.	ricue		Dat	ta Sheet	1 8		USAEC	
			Dai	a Difect		ConNi	FT MEADE	
Date Sampled:	2-23-9	37	Sampled Rv	Licania I.		Case No.	67069	
Depth to Water			Total Depth:	WERRER / COLI	THWAITE	Pock 40	OCATION	
02 21.0						M		
			0 0	PID 0.5			- DOUE-1	
Measuring Poin	t: BLACK	MALK	700 0	F PVL KI	HER	(DSY		
Equipment: K	ECK PV	nr,	TEFLON A	BALL			2	
WELL VOLU	IME (* us	se approp	riate values i	n table for each	code letter)	. •		
	Well		h Screen Bottom	Depth Water	. Ga	llons of Water (well)	г	
	0. 44	x [(L	34.1	- 24.7]]=[7.1].	
ANNULAR V	OLUME	(ASSUN	IE 30% PC	PROSITY)				
	annulus	Dept	h Screen Bottom	Depth Bottom of Sea		lons of Water	·	
		x [(37.1	- 22.1		(annulus) / 5 ⁻ . 4] .	
WATER TO B	E REMO							
	Gallons of Wate	er Ga	llons of Water (annulus)	Removal	Total Gallon be Remove		Actual Gallons	
]]	7.1] + [Multipler =		;u	Removed	
MEASUREMI	ENTS			/] ^ [_ 3 _] =	115		115	
Well Purging	21110			•		Well	Annulus *	
N	umber			•		V well	dia V annulus	
Time	Gallons					1.5"		
1230	moved O	рН 4. 4 3	Conductivity		Turbidity	0.10gal/ft	4.0 0.29gal/ft	
1400	15	4.33	1196	12.9	2999	2"	6.5 0.46gal/ft 7.25 0.59gal/ft	
						0.17gal/ft	7.75 0.69gal/ft	
						U.I. gabit	8.25 0.79gal/ft	
						4"	8.25 0.64gal/ft	
D + C						0.66gal/ft	10.25 1.06gal/ft	
Post Sampling	115	4.49	7.8				12.25 1.63gal/ft	
		9.71	1208	13.1	>999	6" 1.5gal/ſt	12.25 1.41gal/ft	
SAMPLING								
		Volume	Filtered					
Sample ID Ar	alysis	(ml)	(Y/N)	Preservation	Co	ntainer	Time	
		2 440	N	HCI off 2	2	222		
1.1	NA	1000	N	16		BER	1415	
		500	M	HNOS PHE			1415	
Me Me	TAL	500	<u> </u>	HNO2 PHC			1415	
Notes (include da Estimated de	ta on floate	ers/sinka	c with man					
ESTIMATED DE	PTH TO B	077°M	S With meast	ring device, we	Il condition,	etc.)		
		•	•	-: 100 200	T 3 'SAN	שאר נט	UCLUME	
sumes 30% porosit				1				
Signature	gp N	wit		Date 2 27	57 No. of	Bottles	5	
	/	()				_ 555165		
•		-						

1						
Arthur D Little	Monitoring	Well San	ınlina	Well No.	MW-42	
	Dat	a Sheet	-pmg	Client	ISAEL	
Date Sampled: 2/24/97				Case No.	FT MEADE	
Donth 4 vv		HAUSTONIA	FRUCE		47067 OCATION	
Depth to Water: 42.15	Total Depth:	46.91	-,,,,,,,,	th L	OCATION	
O ₂ 20.9 LEI			·	-	1	
		PID 1.4				
Measuring Point: BLACK N	lark topof pul 1	LISER		DS	A 11	
LECK PUMI	TECHALLY					
COLUME (use	appropriate values in	table for each	code letter)	The same	-42	_
V Well	Depth Screen Rottom	Depth Water	~ .	lons of Water		- 1
A NINITING TO THE RESERVE A	[(46.9	42.2	7	(well)	7	- 1
ANNULAR VOLUME (A	SSUME 30% POI	ROSITÝ]	_
V annulus	Depth Screen Bottom	Depth	Galle	ons of Water		
1.06 x	(46.9	Bottom of Sea	(annulus)		
WATER TO BE REMOVE	ED	71.5]]= [/	6.3		
Gallons of Water (well)	Gallons of Water	Removal	Total Gallons	to	1-41-2 "	7
	+ (annulus)	Multipler	be Removed		Actual Gallons Removed	1
MEASUREMENTS		x 5 =	103.5		105	
Well Purging				Well	Annulus *	1
Number of Gallons		•		V well	dia V annulu	s
Time Removed	pH Conductivity	m	1	1.5" 0.10gal/ft		1
1420	Conductivity 175 1773	Temperature	Turbidity 599		4.0 0.29gal/ft 6.5 0.46gal/ft	
			0		7.25 0.59gal/ft	1
				0.17gal/ft 7	7.75 0.69gal/ft 3.25 0.79gal/ft	
				4" 8	3.25 0.64gal/ft	
Post Sampling				V.UUVXI/II I	0.25 1.06gal/ft 2.25 1.63gal/ft	
	77	11.8	7999	6" 12	2.25 1.63gal/ft 2.25 1.41gal/ft	
SAMPLING				1.5gal/ſt	8	
Volu	mo Fu					
Sample ID Analysis (m	~ med eu	Preservation	_			
DIMOOYZYV VOA ZX	<u> </u>		Conta	iner	Time	
DIM0042 45 DNA 100		101 pHer	Amo		1430	
DIMODIZZM METAL 500 DIMODIZZM METAL SON	- MI	VOQ PHEZ	AMBE		1430	
The TAC	Y HA		MORE		1430	
					7730	
Notes (include data on floaters/si	nkore with					
Notes (include data on floaters/si Assumed 5178 & ANNULUS	arkers with measuring	g device, well c	ondition, etc	.)		
Assumes 30% porosity						
		3				
Signature 9 P Nam	Date:	e 2/24/93	No ser	=		
,	_	1 110	40. 01 R0	tiles 5		
•						

Arthur D Little	Manitaring Wall Compline			Well No. Mw- 435		
	Monitoring Well Sampling Data Sheet			Client U)ACC		
				Project F7 MEADE		
hoto Complete of a local	I Community of the control of the co			Case No. 6 70 69		
Date Sampled: 2/29/99 Sampled By: we BAER/GOLDTHWAITE				P _N LO	CATION	
Depth to Water: 35.5	Total Depti	1: 42.2'		•		
O ₂ 20.9 LEL 000 PID 0.0				DSY	71	
Measuring Point: BLACK MARK 700 OF 19UC RISER						
Equipment: KECK PUMP, TEFLOW BALLER						
WELL VOLUME (* use appropriate values in table for each code letter)						
V well Depth Screen Bottom Depth Water (well)						
$0.66 \times [(42.7 - 35.5)] = 4.4$						
ANNULAR VOLUME (ASSUME 30% POROSITY)						
V annulus Depth Screen Bottom Bottom of Seal (annulus)						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						
WATER TO BE REMOVED						
Gallons of Water Gallons of Water Removal Total Gallons to Actual Gallons (well) (annulus) Multipler be Removed Removed						
[(4. 4	+ 14.1])]x	102.5],	105	
MEASUREMENTS				Well	Annulus *	
Well Purging Number				V well	dia V annulus	
of Gallons				1.5" 0.10gal/ft	4.0 0.29gal/ft	
Time Removed	pH Conducti	vity Temperature Te	irbfdity		6.5 0.46gal/ft	
0920 120	4.21 177	8 11.7	D	2"	7.25 0.59gal/ft 7.75 0.69gal/ft	
				0.17gal/ft	8.25 0.79gal/ft	
				4"	8.25 0.64gal/ft	
70 (C)				0.66gal/ft	10.25 1.06gal/ft 12.25 1.63gal/ft	
Post Sampling 120	4.42 174	3 11.6	>999	6" 1.5gal/ft	12.25 1.41gal/ft	
SAMPLING			• · · · · · · · · · · · · · · · · · · ·	1.5gavit	11	
SAMI LING	Walana Eli					
Sample ID Analysis	Volume Filtere (ml) (Y/N)		Co	Container Time		
DIMONDEYU VOA	2 4 40 N	Hel He		nen	4844	
DIMONASAS BNA	(016 N	166		900	<u>0934</u>	
DIMO485 YM METAL	500 H	HNO, PH LZ		AL	-130	
plmb4352m megal	500 4	HAIL PA = 2	HOI	15	0930	
Notes (include data on floa	ters/sinkers with m	easuring device, well c	ondition	etc.)		
ASSUMED SIZE OF AN	NULUS	g		, ••••,		
200						
*Assumes 30% porosity		,				
Signature 6 √ 1	Samt_	Date 7.124/63	NT.	f Rottlee	5	

			Monitoring Well Sampling						Well No. M W -43D Client USAEC				
Arthur	D Littl	e	1120	_		Sheet	6	_	Project FT MEADE				
				Dai	iu L	Jiicct			Case No.	670			
Date Sample	ed: 2/2	4/93	5	Sampled By:	WER	SER GULLYTH		N LO	CATIO	N			
Depth to Wa	iter: 30	2 '		Fotal Depth:		73.0'				7.			
02 20.	D 0.0					¬							
Measuring Point: BLACK MARK TOP OF PUL RISER										DSY			
Equipment:	KELK	ru me	- , 7	EFLON B	ALL	.ER			@ nn. 470				
WELL VO	LUME (* use a	pprop	riate values	in ta	ible for each o				-			
	V well	x		h Screen Botton	· - [Depth Water]]=[ons of Water (well)	•			
ANNULAR	R VOLUM	1E (A	SSUN	1E 30% PC	ORO	OSITY)					•		
	V annulus		Dept	h Screen Bottom	1	Depth Bottom of Seal			ns of Water innulus)	• •	•		
	1.06	x	[(93.0	- [81.0])]=[2.7				
WATER TO	O BE REI			allons of Water		Removal	Total G	llons	to	Actual	Gallons		
r	(well)	_	(annulus)	\ T	Multipler	be Rer		<u> </u>	Rem	oved		
MEASURE	MENTS		+	12.7)]:	x 3 =	25	Ψ	Well		nulus *		
Well Purgin	Ø								V well	dia	V annulus		
Trem I di Gin	Number of Gallons								1.5"				
Time	Removed		pH	Conductivi	ty	Temperature	Turbidit	y	0.10gal/ft	4.0 6.5	0.29gal/ft 0.46gal/ft		
1130	140	_	4.72	1518		9.0	384		2"	7.25	0.40gal/ft		
			1.1 -		_	<u> </u>			0.17gal/ft	7.75	0.69gal/ft		
											0.79gal/ft		
				-	_				4"		0.64gal/ft		
				-	_				0.66gal/ft		1.06gal/ft		
Post Samplin	1g 760		6.57	545	_	11.4	17		6"	12.25 12.25	1.63gal/ft 1.41gal/ft		
					_				1.5gal/ft				
SAMPLING	G												
Sample ID	Analysis		olume (ml)	Filtered (Y/N)		Preservation		Co	ntainer		Time		
MO430YV	UDA		440			Hel pH = 7			BER		1145		
12043045	BNA		100	_ <u> </u>		10€			BEN		1145		
MYDEYOM	METALS		.00			4NO pH =		DPC			1145		
MEGEHOMI	metrus		70	<u> </u>	_ &	ING, PH CT		6 P			145		
Notes (inclu Assumed s	de data on	floater NNVL1	s/sink	ers with mea	suri	ing device, we	ell condit	ion,	etc.)				
Assumes 30% p	oorosity					•							
	ature 9	Na	xt		D	Date 2 /2 4/	197 N	0. 0	f Bottles	5			
-	7		0		_				•				

	3.6	•	Well No. n- 200					
Arthur D Little	M	onitoring V	-	ling	Client USAER			
Mullipelitue		- Data	Sheet		Project MEADE			
					Case No. 67-069			
Pate Sampled: 2/23/9	13	Sampled By:	EBBER GOLD	HUARE	TH LO	CATIO	N	
Depth to Water: 50.3	5	Total Depth:	59.751				7	
O ₂ 21.0 LE	T. O	P	ID 0, 0		t	7		
					DSY	, <u>'</u>		
Measuring Point: Not	4 1	~ TOP OF	PVC PL	SER	1			
Equipment: KELK	OVMP	, TEFLON	BAILER		MW-200		•	
WELL VOLUME (* us	e appro	priate values in	table for each o	ode letter)				
V well		pth Screen Bottom	Depth Water		llons of Water			
		59.8	50.4])]= [(well) 6.2	1		
				J / J - L	<u> </u>			
ANNULAR VOLUME	(ASSU	ME 30% POF	•	Co	llons of Water			
V annulus	Dej	oth Screen Bottom	Depth Bottom of Seal	- Ga	(annulus)			
1.06	x [(59.8	43.0]] = [17.3			
WATER TO BE REMO	VED			Total Calle			a n	
Gallons of Wat	er (Gallons of Water (annulus)	Removal	Total Gallo be Remov		Actual Rem		
[(4.2] + [x S =	120		12	D	
MEASUREMENTS		•			Well	An	nulus *	
Well Purging					V well	dia	V annulus	
Number of Gallons					1.5"		, unitario	
Time Removed	рН	Conductivity	Temperature	Turbidity	0.10gal/ft	4.0	0.29gal/ft	
1440	4.68	.234	7.5	99	-	6.5 7.25	0.46gal/ft 0.59gal/ft	
No10 120	4.40	1226	11.9		2" - 0.17gal/ft	7.75	0.69gal/ft	
					- U.17gabit	8.25	0.79gal/ft	
					- 4"	8.25	0.64gal/ft	
					- 4" - 0.66gal/ft	10.25	1.06gal/ft	
Post Sampling			**************************************				1.63gal/ft	
1670 120	4-66	. 119	11.9	355	6" - 1.5gal/ft	12.25	1.41gal/ft	
CAMPING					2.00	1	l	
SAMPLING								
Console ID Academia	Volume		Preservation	(Container		Time	
Sample ID Analysis	(ml)	(Y/N)	r reservation		ontainer	_	11111111	
DIMOZOO Y.V VDA	2 × 40		HUI PHEZ		MBER		615	
DIMOZONYS BNA	1000		ILE		MAKE		615	
Meroya Merang	506	<u> </u>	HNO2 PHLZ		OPE		1615	
DIMOSOBEM WEAKL	500	<u></u>	HNOZ PHLZ		DIE		615	
Notes (include data on floa	otore/cin	kons with moss	ning device	11	4 - \	-		
Notes (include data on floa PSY PIEVO BLANK	Q(X =	153 YV, YS,	ring device, we	u conditio	n, etc.)			
DSY RINSE BLANK	BIX	253 YV, YS,	YM DECAN		00			
Assumes 30% porosity		, , ,	•					
Signature SP/	1/2	1	Date 2/23/		of Rottles	~		

Signature GP Nough

Date 2/27/47

No. of Bottles

			Well No. DS7	-MW/LOT		
	Monitoring	Well Sampling	Client USAEC			
Arthur D Little		ta Sheet	Projectf661			
			Case No. 67			
Date Sampled: 3/13/93/3	Sampled By:	: webber friedense	m LOCA	TION ppose 40 cm		
Depth to Water: 30.99		38.73				
	EL 500	PID 1.7		1201		
Measuring Point: notels	in puz visek		_(he w		
Equipment: Keck pump	, teflon bailex		(10)			
WELL VOLUME (* u	se appropriate values	in table for each code le	(IEF) Gallons of Water			
V well	Depth Screen Botto	m Depth Water	(well)			
0.66	x [(<u>38.73</u>	30.99)]=	3.11			
ANNULAR VOLUME	(ASSUME 30% P	POROSITY) Depth	Gallons of Water			
V annulus	Depth Screen Botto	m Bottom of Seal	(annulus)			
1.06	x [(<u>38.73</u>] - <u>[[[[] </u>	16.79			
WATER TO BE REM	OVED	Domoval		ctual Gallons		
Gallons of Wa	(annulus)	Multipler, be	Removed	Removed 57		
[(_5.11_	+ 18.79)]x <u>5</u> = 1	T	Annulus *		
MEASUREMENTS			Well V well	dia V annulus		
Well Purging Number			1.5"			
of Gallons Time Removed	pH Conduct	ivity Temperature Turt	oldity 0.10gal/ft	4.0 0.29gal/ft 6.5 0.46gal/ft		
Time Removed	•		63 2"	7.25 0.59gal/ft		
3/18/93 D			0.17gal/ft	7.75 0.69gal/ft		
1.50 57	4.68 0.18	12.0 7		8.25 0.79gal/ft 8.25 0.64gal/ft		
			4"	10.25 1.06gal/ft		
			0.60gal/it	12.25 1.63gal/ft 12.25 1.41gal/ft		
Post Sampling 59	4.79 0.21	9 12.5 7	1.5gal/ft	12.23 1.41guz.t		
SAMPLING						
SAMI LING	Volume Filter	ed		Time		
Sample ID Analysis	40ml (x2) (Y/N	Preservation	Container amber 4 455 Val	(2)		
	1000	Tae	ambagassiar			
DIMOZONS SVOA DIMOZONYM METALS	500	MNOZ	HOPE			
DIMEDIZM FILT-METHE		0	<u> </u>			
7170021						
	o to distance with a	massuring device well co	ondition, etc.)			
Notes (include data on f	noaters/sinkers with 1	measuring device, wen ee				
* Assumes 30% porosity			N. 070-441			
Signature		Date	No. of Bottles			

Appendix B: Fire Training Area Field Forms

Appendix B-1: Fire Training Area Soil Boring Logs and Monitoring Well Installation Logs

Boring No. FTAMW-1 USAEC Client Arthur D Little Soil Boring Log Project Fort Meade Case No. 67069 - ZZ LOCATION Pate Start 1/21/98 ATEL Contractor ate Complete 1/21/93 **Drill Method** Hollow Steem Auger Mobil B-61 Type Of Rig Hole Diameter **Drilling Additives** No Casing Size 0.6' PTAMWA! 15.0' Geologist M. areenwood 9. Nauchton **Boring Depth** Sampling Method SPLIT SPOON GEOLOGIC DESCRIPTION SAMPLE Blows Total Scale Unified Soil Class ID, color (Munsell System), grain size, Type Per Organics in sorting, moisture, compaction, indication of contaminants Interval Recovery and 6" Feet (ppm) (unusual odor or sheen), and general stratigraphic description number 0.0 [Sw) Fire grained sand, dry, petroleum odor 0.5-1.5 SSON 8354 0.7 2.5 0.4-1.21 darkyellowish orange 104R6/6 1.0 well sorted fine sand trace sub angular pebbles, moist 1.2 - The light brown Syr 5/6 poorly sorked fine to medium sand, some subangular pe bloss, loose 20 30 4.0 -5.0 [SP] Light brown 5YR 5/6, Poorly Sorted fine to medium send, moist, loose SSOL 5.00 1.25 6.7 0 7.0 12 0.ط 7 12 7.0 8.0 9.0 10.0 POORLY SONTED PIVE TO MEDIUM SAND, 0.1-0.2' FINE SILT LIGHT BROWN, MIST, MEDIUM DENSE 000-[1 5503 7 12.0 -Il. o 12 [58] 13 120 Lit

Rod Sige - AW Bittype - NA Pumptype - MOYNO Augerliasing Sige - 65/8 10
11.6 00
Hammer weight - 140 lbs
length of fall - 30 inches

Page 1 of 2

Artlur D Little

Soil Boring Log Continuation Page

Boring No. FTAMW-1
Client USAEC
Project Fort Mede
Case No. 67069-22

1						Case No.67069-22
Scale in Feet	Type and number	SAMPLE Interval	Recove	0	Total Organics (ppm)	(unusual odor or sheen), and general stratigraphic description
-13.0 - -14.0 -	ડ કન્પ	13.0- 15.0'	(,5	5 6 7	1.4	My - 0,8 dark yellowish brown login 4/2 stit, - gome chey, trece fine sand, moist eijo.8-1.5 dark yellowish brown login 4/2, clayey silt, trace fine sand, moist, loose -
- - -						
-						
- - -						- - - -
- - -						
-					,	
- -						- - -

	Arthur I	D Littl	е	S	oil Bo	ring Log	Boring No. FTAMW-Z Client USATHAMA Project Fort MEADE Case No. 67069-22
Dat	e Start	1/19/93		Contra	ctor A	TEC	LOCATION
Dat	e Comple		0/93			ollow Stem Auger	
-	Diamete		2[15	Type O	f Rig AA	obil B-61	N
	ing Size	0.6		Drilling	g Additiv	es —	helicopter
	ing Depth					EENWOOD, G. Warghtou	0 1
			its soon	124 2014	2 010	eenwood, a. wacannou	O FTANWOZ
04		SAMPLE			levery	GEOLOGIC DE	CCDIDTION
Scale	Type	SAMPLE	1 .	Blows	Total	Unified Soil Class ID, color	
in Feet	and number	Interval	Recovery	Per 6"	Organics (ppm)	sorting, moisture, compaction	
-1.0	SSOF	0-2	22"	6 10 4	22.2	SP) Sand, dry, Loose	rted Medium to course _
_2.0							
L							
3.0							Ī
							П
Γ.							4
4.0							-
F							4
-5.0							
-	geo	5-7'	12:5"	5	22.2	[SP] SAME as above,	moist
-6.0	S502			10		,	
L				13 14			
_7.0				17			1
L							
Laa							4
							-
٢,]]			4
9.0		İ	1	ľ			
H		İ	1	l			4
10.0	66						
-	geo	10-12	104	4	26.7	[SP] same as above,	very wet
-11.0	2203		j			[· · · · · · · · · · · · · · ·	7
				5 0			
[ILO				9	ļ		1
13.0							-

Rod size -AW but Type - NA Pumptype - MOYNO

AUGER/COSING SIZE - 65/81D 11.6 00

Page 1 of 2

Hammer weight - 140 lbs length of fall - 30 wiches

Artiur D Little

Soil Boring Log Continuation Page

Boring No. FTAMW-02
Client USATHAMA
Project For MEADE
Case No. 67069 - 22

					Case No. 67069 - 27					
le Type	e SAMPLE Type			Blows Total Unified Soil Class ID, color (Munsell Sys						
t and	Interval	Recovery	Per 6"	Organics (ppm)	sorting, moisture, compaction, indication of contaminants (unusual odor or sheen), and general stratigraphic descript					
3.0										
	İ	•								
0										
n geo	14,5-	16"	1		3-16" DK Yellowish brown 10 YR 4/2, SIETY WI					
5504			2	14,0	(ML) Some fine sand, trace clay, moist, Very Loose					
7.0		6	4		[ML] Some fine sand, trace Clay, moist,					
			4							
					I A TUDI OF 1500 llons weren & of approx					
7					water was used to flush out neavy					
		.			* A Total of 15 gallons weren of approxulation used to flush out nearly sedimentation					
					-					
		i								
			:							
				·						
1	1 1									

						•	Boring No. FTAMW-3					
_	Artlur D Little				Sall Da	wing I ag	Client USAEC					
#3	M. C. C.			2	on bo	ring Log	Project FORT Meade					
						·	Case No. 67069 -22					
	Start 1			Contra		ATEC	LOCATION					
	Comple		95/0	Drill M	1ethod +	tollow Stem AUGER	N PTAMW-3					
	Diamete	r 1.1'	<u>/> 8</u>	Type C		Mobil B-61						
	ng Size	0.6'	(0,4		Drilling Additives None							
	ng Depth			Geolog	ist M. Gree	enwood (J. Noughton)	TANK U					
Samj	pling Me	thod 2'x	44 MS 50	litspoo	a every	5.0'						
	4	SAMPLE	•	Blows	,	GEOLOGIC DE	SCRIPTION					
Scale in	Type			Per	Total Organics		(Munsell System), grain size,					
Feet	and	Interval	Recovery	6"	(ppm)	sorting, moisture, compactio						
	number				(PP)		neral stratigraphic description					
-0.0	geo	0-2'	1.2'	,,	0.0	Predominant y darl	ediam & singe sand with					
_	3501			4		Some copplied and si	ob rounded pebblos dry					
-1.0	7301	1		15		[57] Loose compaction.	12 100 100 100 1019					
-1.0				12		The first of inches of t	he sman was moderate					
-				1		Yellowish brown in	he spoon was moderate					
_2.0				 		Sand with some so	n. pelobles and some organist					
-				1			-					
_3.0		1					· -					
					1		_					
٧1 .												
4.0												
							7					
_50	Gon	'	1 /	 		Co. I						
-	geo	5-73'	•	3	3.4	same as above, ve	sq moist, grain size -					
-6.0	5-7			6		[SP] depth, no eabbre	ssively smaller with _					
-			٠	8		r - when his eapple	.5					
_7.0				ש								
80							- 7					
-0~												
							+					
_2.0												
.							4					
_10.0						Martin						
.	900		1.41	5	0.0	love who will hande	lark yellowish orange					
_4.0	10-121		•	10		(5°) and pale yellowish	brown byrch					
		ĺ		8		" " I'M I'M SOFTED TIME S	and Venimoist.					
12.0	İ	l		9		toose compaction	, , ,					
-120												
							4					
.0	1	- 1	1		i		4					

Rod Sige - AW BIT Type - NA Auber/Casing -65/8 10

Page ____ of ___

DUMPTYPE-MOYNO

Hammerweight- 140 to. length of hommerfall- 30 inches

Λrtiur D Little

Soil Boring Log Continuation Page

Boring No.FTAMW-3
Client USAEC
Project FORT MEACE
Case No. 67 069 -22

Scale in Type and Interval Recovery 6" Total Organies (ppm) 130 900 18-15' 1.0' 2 1.0' 2 1.0' 5.05' 1.0' 4 5 1.0' 5.0' 5.0' 4 1.0' 5.0' 5.0' 5.0' 5.0' 5.0' 5.0' 5.0' 5							Case No. 67 069 -22
Type Interval Recovery Per Organics Organic			SAMPLE		DI.	Total	
Feet number Grant	1 .	Type					Unified Soil Class ID, color (Munsell System), grain size,
number 13-15' 11.0' 15.0 1			Interval	Recovery			Sorting, moising e, compaction, material of committee
15.0 15.0	reet	number				(ррш)	(unusual odor or sheen), and general strangraphic description
15.0 15.0	-130	G00 4	12-15'	1.8'	^	30	1916 - 1 wish
# A TOTAL OF 30 gallons of approved H20 were lost down the well while drilling in an effect to flush out treavely sedimentation. # ATOTAL OF 30 gallons of approved H20 were lost down the well while drilling in an effect to flush out treavely sedimentation. # ATOTAL OF 20 GAL OR APPROVED WHITE WAS USED TO FRISH OUT THE MENTING Additional boundary INSINE THE GRINS.		condit	13 12			0.0	mine sand, were vollowish brown 10 yr 4/2, 311+ with -
# A TOTAL OF 30 gallons of approved H20 were lost down the well while drilling in an effect to flush out treavely sedimentation. # ATOTAL OF 30 gallons of approved H20 were lost down the well while drilling in an effect to flush out treavely sedimentation. # ATOTAL OF 20 GAL OR APPROVED WHITE WAS USED TO FRISH OUT THE MENTING Additional boundary INSINE THE GRINS.		22044			4		otkome morty sorted fine sand trace day, sime prat,
# A TOTAL OF 30 gallow of approved the were lost down the well while drilling in an effort to flush out the analy sedimentation. # ATOTAL OF 30 gallow of approved the were lost down the well while drilling in an effort to flush out the analy sedimentation. # ATOTAL OF 20 GAL OR APPROVED WHITE was used to see to see to see the provide the result of the result was used to see the point of the result of the country and the coun	-14.0				۲	101	Muist a typilmish brown 10 47 4/2, Clayeys, 1+
* A TOTAL OF 30 pallow of approved Hzo where lost clown the well while drilling in an effort to flush out treavely sedimentation. * A TOTAL OF 20 GAL. OF APPROVED WATER was used to Freight out the labelly was used to Freight out the labelly adimental buildup inside the Gising.	-				,		KIT 1.5-1.9 DECEMENT OF A STATE AND CAMPAGE CAMPAGE
than effort to flush out heavyly Sedimentation. # ATOTICAL 20 GAY OF APPROVED WHITELE WAS USED TO FRUSH OUT THE MENTING Zedimental bould-up inside the Gainst	-15.0						to Just trace wire sand, most, mose commaching
than effort to flush out heavyly Sedimentation. # ATOTICAL 20 GAY OF APPROVED WHITELE WAS USED TO FRUSH OUT THE MENTING Zedimental bould-up inside the Gainst					:		
than effort to flush out heavyly Sedimentation. # ATOTICAL 20 GAY OF APPROVED WHITELE WAS USED TO FRUSH OUT THE MENTING Zedimental bould-up inside the Gainst	Γ						THOTAL OF 20 pellons of approved 420
In an effort to flush out heavyly sedimentation. # ATOTAL OF 20 GAL OF APPROVED WATER WAS USED TO FRUSH OUT THE MENTION Addinumbed build-up inside the Gent	—						were lost down the well while drilling
* AMOTHE OF 20 GAV. OR APPRIOUED WHETE WAS USED TO FLUST OUT THE MAGNIFUL SENTIMENTAL DEVILOUP INSIDE THE GENTLE	-					ļ	in an effort to flush out heavyly
* AMOTHE OF 20 GAV. OR APPRIOUED WHETE WAS USED TO FLUST OUT THE MAGNIFUL SENTIMENTAL DEVILOUP INSIDE THE GENTLE							Sedimentation, -
Addimental booldap inside the asing							_
Addimental booldap inside the asing	 						* ATOTEC OF 20 GALL OF APPROVED WATER
Addimental booldap inside the asing	_						was need to Experi out the Agovily
	L						sodioscoli buildus inside the count
							and the police of the state of
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Page 3 of 2	LI		ļ				4
Page 1 of 2							
							Page 1 of 1

Artlur D Little	Monitori	Boring No. FTAMW-1 Client USAFC		
		8		Project Fort Meade
Data Start				Case No. 67069-22
	e Complete 1/71/9		iameter (,t'	Casing Size 0.6'
Contractor ATEC		Geologist	M.greenwood	.9. Nautotiton
Drill Method Hollow Ste	m Auger	Boring Dept		
Type Of Rig Mobil B-	01	Grout metho	od Portland Gy	pets) Cement & bentonite
Datum double notch f	VC CIDEC	Developmen	t Method To k	se developed
Notes				•
Scale in Type Total Feet and Organics number (ppm)	Well Construction Stratigrap Annulus Well	hy —	Constru	ection Specifications
-0.0 -2.0 -3.0 -4.0 -5.0 -7.0	SAND. SAND. SAND. SAND. SAND. SAND.	(See Boring Log for detail)	(surve (depth) Type of Surface L.D. Surface Cas Type Of Riser P L.D. Riser Pipe Diameter Of Book Type Of Seal Ran Depth To Top Of Type Of Sand Pa Depth To Top Of Type Of Screen Slot Size	of Riser Pipe

*CETCO - Colloid Environmental Technologies Company md - Medium

9.0

Page 1 of 2

Depth To Bottom Of Well 13.5

Depth To Bottom Of Borehole 15.6

Λrthur D Little		M		ring `		Design)	Boring No. FTAMW-1 Client USAEC Project Fort Mosde Case No. 67069-22		
Scale in Feet	SAMPLE Type Total and Organics number (ppm)		Well C	onstruc — Stratig Annu We	raphy ılus 7	gram	Notes and Comments		
			¥	, ,					
-10.0			8 0000000 P000000	1	1		PICKET	CONFIGURATION -	
_ll.o				AND	20.		0	-	
- 				N S	AS 51		u.		
- -B.0				FILTER	21712		.,	4.0	
- _H.o					1.		go H.		
_;5.0							ě	PICKE14	
•					1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			_	
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Arthur D Little

Monitoring Well Design

Boring	No.	FTA	S-WM	
Client	USF	HTH	AMA	
Project				
Case No				~

Pate	Start 1 20	93 Date	Complete 1-20	- 93 Hole D	Piameter 1.1' Casing Size 0.6'		
		EL			MARY Greenwhoo, George Naubuton		
Drill	Method H	OLLOW STEM	n Augur	Boring Depth 16.6 FEET			
Type	~ ~ ~ .	OBIL B-6		Grout metho	od 20 of Portland (II) coment & Bent.		
Datu			DVCTISE	Developmen	it Method TO BE DEVELOPED.		
Notes							
C .	SAN	IPLE	Well Construction	n Diagram			
Scale in	Type	Total	Stratigra	phy ———	Construction Specifications		
Feet	and	Organics	Annulu	ısı	Construction of positions		
	number	(ppm)	Well				
3.0							
•				1 1	Elevation Top Of Casing		
.5.8			1 1 LA	V	Elevation Top Of Casing		
~ 2.0					Elevation Top Of Riser Pipe		
			The l	8	Elevation Ground Surface		
1.0				(See Boring			
•				Log for detail)	(surveyed elevations)		
- 0.0				detail)	(depth from ground surface)		
-					1		
1.0			18	E.	Type of Surface Casing 2.6' STOINESS 24 21		
			Z Z	4	I.D. Surface Casing 6"		
_2.0			# 0 55	of Pure gold Medium	Type Of Riser Pine PVC		
		·	T-for	Chips	Type Of Riser Pipe PVC I.D. Riser Pipe 4"		
8.0			8. > 4	CETCO			
_5.0			·;. :		Diameter Of Borehole		
					Type Of Backfill 917007		
4.0				•	_		
-			1:4-1:		Type Of Seal Beatonite Chips Depth To Top Of Seal 1,6'		
_5.0					-		
.		İ	1:: -1:		Type Of Sand Pack Silve Querts (AS 14309 60]		
_6.0			100.1-10	Silica Guarta	Depth To Top Of Sand Pack 3.0'		
		.	10-	" Cas"	Type Of Seven		
_7.0	l		FILTER SAND	3 N908-60-7	Type Of Screen 1 - Slot Size 6.010		
- 1.0			L. S	1 1	I.D. Screen 4"		
	İ		हैं द	D	Screened Interval 13.6 - 3.6' -		
_8.0	1		الخ الح	FILTER	, -		
.			1, 6	7	Depth To Bottom Of Well 13.6		
9.0			1::17:				
			13:14:	•:	Depth To Bottom Of Borehole 16.6		
		*			7		

Λrthur D Little

Monitoring Well Design

(Continuation Page)

Client SATHAMA
Project FORT MEADE

Case No. 62067-22

	1	(30	Case No. 67069-22
Scale in Type and Conumber SAMPI	Total Organics (ppm)	Well Construction Diagram Stratigraphy Annulus Well	Notes and Comments
number - 10.0 - 11.0 - 12.0 - 13.0 - 14.0 - 15.0 - 16.0 - 17.0 - 17.0 - 17.0	(ppm)	SAND FICTER	Picket fencewas constructed 4.0' from the PVC riser, Pickets extending 3.0' above the surface 4.0'

Arthur D Little	Monitoring Well	Design Client USAEC						
		Project FORT MEADE						
Date Start 1-20-93 Dat	to Complete	Case No. 69069 - ZZ						
1 4		Diameter Casing Size O, 6'						
710-	Geologist	M. Greenwood, G. Noughton						
Drill Method Hollow St	En Auber Boring Dep	oth 14.10'						
Type Of Rig Mobil 8-6 Datum Double Abril 8-6	Grout meth	od Portland (II) cement, Bent. & HeO						
Notes	Development Development	nt Method To be cleveloped						
Scale SAMPLE	Well Construction Diagram							
in Type Total Feet and Organics	Stratigraphy ————————————————————————————————————	Construction Specifications						
Feet and Organics (ppm)	Well							
2.5 2.0 1.0 -0.0 -2.6 -3.0 -4.0	(See Boring Log for detail) Portland Type II come Bentonite Porce Gold Medium Chips CETCO	(surveyed elevations) (depth from ground surface) Type of Surface Casing Stewness steen I.D. Surface Casing H 6 11 Type Of Riser Pipe PVC I.D. Riser Pipe 4 11 Diameter Of Borehole 1.1 Type Of Backfill NA Type Of Seal Benjonite Chaps mediumchip) Depth To Top Of Seal 1.6						
-6.0	Firter Si evilili filter SA	Type Of Sand Pack Silva Garts CAS 14808-60-7 Depth To Top Of Sand Pack 3.0 Type Of Screen PVC						
0. F. . W.	Silica	Slot Size 0.010 I.D. Screen 4" Screened Interval 13.6' - 3.6'						
1.0		Depth To Bottom Of Well 13.6' Depth To Bottom Of Borehole 14.10'						
Da		7						

Boring No. FTAMW-3

Λ	rtlur D I	.ittle		Monitoring \(\begin{align*}(\Continuation*)		_	Client USAEC Project Fort Mede Case No. 67069-22	
Scale in Feet	SAN Type and number	MPLE Total Organics (ppm)	Wel	Il Construction Dia Stratigraphy Annulus Well	gram	Note	es and Comments	
			•					
1				FILTER SAMP FILTER SAMP FILTER SAMP		ory	4 5.6 Pickets installed 2.6 Into the ground, - 4,0' From PVC riser	
-								

Boring No. FTAMW -3

Appendix B-2: Fire Training Area Monitoring Well Development Logs

		Monitoring Wall Well No. Framw-1										
Arthur D Little	Monito:	ring Well		Client USAEC								
With the Futtie	Developmen	nt Data Sh	neet [F	Project Ft. Mescle								
				Case No. 67069-26								
Date Developed: 9/5/98 Developed By: M. Greenwood LOCATION												
Depth to Water: 5,19	Total Depth:	15,71										
02 BD-20.7 AD- LEL DD-0.00 HNu DD-0.4 AD-												
Measuring Point: Double Noten on PVC Riser												
Notes: Puc Stick-up - 1.45'												
WELL VOLUME (* use appropriate values in table for each code letter)												
Gallons of Water												
0.66	x [(/5. 7/ -	5-19]]= [(well)								
ANNULAR VOLUME	(ASSUME 30% PO	ROSITY)										
Depth Gallons of Water												
V annalus Depth Screen Bottom Bottom of Seal (annalus) $1.06 x [(5-7) - 3.00] = 18.47$												
WATER TO BE REMOVED												
Gallons of Water Gallons of Water Removal Total Gallons to Actual Gallons												
MEASUREMENTS Well Annalus *												
Number of Gallons				v wen	dia 6.5	V annalus 0.46gal/ft						
Time Removed	pH Conductivity	Temperature	Turbidity	2"	7.25	0.59gal/ft						
0.0 gallons	6.60 ,122.56	n 13,8°C	8	0.17gal/ft	7.75 8.25	0.69gal/ft 0.79gal/ft						
1055 25.0	6.25 .085m5	1	999									
1/10 50.0	6.20 .092mS	1	995	4"	8.25 10.25	0.64gal/ft 1.06gal/ft						
1120 75.0	6.15 .009,5/		345	0.66gal/ft	12.25	1.63gal/ft						
1130 85.0	6,19 .094ms		1,74	6"	12.25	1.41gal/ft						
Depth to Sediment: Before 15.71 After 15.7(
Pumping Rate Recharge Time												
Time to Develop Well: Start 1030 Finish 1175 Duration 55000												
COMMENTS (include description of water removed)												
The water began to become visibly clearer around 45 gallons												
The second of th												
	* Assumes 30% poros	ity for sand pa	ick									

BD-Brace development 7 DD- Autor development 3 Measure ments taken at the top of the Picriser AD-After development

Monitoring Well Client US AEC									
Arthur D Little		Client US AEC							
Middle Fittle	Development Data Sheet			Project F+ Meade					
			C	Case No. 67069-26					
Date Developed: FEBS, 1993 Developed By: EF/MG LOCATION									
Depth to Water: 6-19	Total Dep								
0 ² 20.6 LEL O HNu 1.6									
Measuring Point: double notch on puc Riser									
Notes:									
WELL VOLUME (* use appropriate values in table for each code letter) V well Depth Screen Bottom Depth Water (well) 3-66 x [(/5-7/ - 6.19)] = 6.28									
ANNULAR VOLUME	(ASSUME 30%)	POROSITY))				
V annalus	Depth Screen Bott	Depth		ons of Water annalus)					
1-06	x [(/5-71] - <u>3</u>		3.47					
WATER TO BE REMOVED									
Gallons of Water	Gallons of Water	Removal	Total Gallons to		tual Gallons				
(well) (annulus) Multipier Be Removed Removed									
TARLE									
MEASUREMENTS Well Annalus *									
				V well	dia V annalus				
Number of Gallons					6.5 0.46gal/ft				
Time Removed	pH Conduct	ivity Temperature	Turbidity	2"	7.25 0.59gal/ft				
14 [0 0.0 gallons 30 -0	6.93 .05		977	0.17gal/ft	7.75 0.69gal/ft 8.25 0.79gal/ft				
15 05 60 · O	5-87 - 06		10						
1520 92.0	5.90 5.88 -06		10	4"	8.25 0.64gal/ft 10.25 1.06gal/ft				
1525 100.0	5.87 .05		10	0.66gal/ft	10.25 1.00gal/ft				
				6" 1.5gal/ft	12.25 1.41gal/ft				
Depth to Sediment: Befo	Depth to Sediment: Before 15.71 After 15.54								
Type/Capacity of pump Keck									
Pumping Rate Recharge Time									
Time to Develop Well: Start 1400 Finish 1525 Duration 225									
COMMENTS (include description of water removed)									
· 15-14 Theathraice									
			_						
	* Assumes 30% p	orosity for sand p	oack						

				. LY	ven No. F	TV L	<u> </u>	
	Author D Little	Mon	itoring Well		Client US	AEC		
	Arthur D Little		nent Data S	_	Project Fort Neadle			
				1	Case No. 67069-26			
	Date Developed: 2 9 93	denson	LOCATION					
	Depth to Water: בול בו Depth to Water: בול בו בו בו בו בו בו בו בו בו בו בו בו בו		A. MAI	<u> </u>	<u> </u>			
	0^2 20.7	PPM	FTAM	X	1			
	Measuring Point: double	1	\bigcirc	1				
	Notes:				1	_ ¥	_!	
	WELL VOLUME (* us V well	Depth Screen Botto x [(」にいら		Gallo	ns of Water (well) ・ちる			
	ANNULAR VOLUME	(ASSUME 30%)	POROSITY)	,			-	
	V annalus	Depth Screen Bott	Depth	eal (ons of Water annalus)	l		
	WATER TO BE REM	OVED		T-4-1 C II 4				
	Gallons of Water (well)	Gallons of Water (annulus)	Removal Multipler	Total Gallons to be Removed	Actual Gallons Removed			
		+ 12.65)] x 5 = [95.9		100		
	MEASUREMENTS				7	ABLE		
	Well							
	Number	m5/c			V well	dia	V annalus	
	of Gallons Time Removed	pH Conduct		Turbidity	2"	6.5 7.25	0.46gal/ft 0.59gal/ft	
	<u>0840</u> 0.0 gallons	3.4 0.1			0.17gal/ft	7.75	0.69gal/ft	
	08:10					8.25	0.79gal/ft	
	0910 25	4.1 0.11	q	990	4"	8.25	0.64gal/ft	
>00 H	<u> </u>	<u>148 4.0 0.10</u>		0-1055	0.66gal/ft	10.25	1.06gal/ft	
clear	1,0945 75	4.2 0.10				12.25	1.63gal/ft	
	1000 100	4.0 0.10)4	90	6" 1.5gal/ft	12.25	1.41gal/ft	
	Depth to Sediment: Befor	re 115.60 Af	ter <u>15.65</u>	difficult to	tell			
	Type/Capacity of pump	KecK						
	Pumping Rate 12-5 9PM Recharge Time Time to Develop Well: Start 0840 Finish 1000 Duration 1hr 20 m							
ı	COMMENTS (include o		removed)					
	-pH on meter resp	onding slowly						
	-water initially red -cleared somewh	dish brown, turi	ad					
	- did not account.	tor standup -> p	orged extra vol	ume				
		* Assumes 30% po	prosity for sand p	ack				

Appendix B-3: Fire Training Area Monitoring Well Sampling Logs

				V	Vell No. F	TA A	m-1		
	M	onitoring	ling [c	Client USAEC					
Arthur D Little		Data Sheet			Project FT MEADE				
					Case No.		069		
ate Sampled: 2-18-13		Sampled By:	ELLINUMOND PRIEDEN	SON NAN SHI an	LOC	ATIO	V		
Depth to Water: 4.42		Total Depth:							
O ₂ Z/.\ LE	L ·	001	PID 6.		\$ (٥,			
Measuring Point: DOUBLE NOTEH TOP OF RISER									
Equipment: DRS WIER FACE PROBE, KECK PUMP, TEPLON BAIL									
WELL VOLUME (* us	e appro	priate values	in table for each c						
V well	De	pth Screen Botton	n Depth Water	Galle	ons of Water (well)				
10-66	x [([16.0	- 4.4])]=	7.64				
ANNULAR VOLUME	(ASSU	ME 30% P	OROSITY)						
V annulus	De	pth Screen Botton	Depth Bottom of Seal		ons of Water annulus)				
0-64	x [([16.0	- 5·0])]= 🗀	7.04				
WATER TO BE REMO	VED			Total College	, to	4 -41	0-11		
Gallons of Wat (well)	er	Gallons of Water (annulus)	Removal Multipler	Total Gallons be Remove		Actual (Rem			
[(7.7] + [7.0)]x <u>5</u> =	73.5		7.	5		
MEASUREMENTS					Well	An	nulus *		
Well Purging Number					V well	dia	V annulus		
of Gallons					1.5" 0.10gal/ft	4.0	0.29gal/ft		
Time Removed	7. 3C	Conductiv		Turbidity	- Olloguett	6.5	0.46gal/ft		
0910 75	7.45	,125	3.7	B	2"	7.25	0.59gal/ft		
					0.17gal/ft	7.75 8.25	0.69gal/ft 0.79gal/ft		
			_				0.64gal/ft		
					4" 0.66gal/ft	10.25	1.06gal/ft		
Post Compling					_		1.63gal/ft		
Post Sampling	756	1127	5.7		6" 1.5gal/ft	12.25	1.41gal/ft		
SAMPLING									
	Volum	e Filtered	1						
Sample ID Analysis	(ml)	(Y/N)	Preservation		ontainer	,	Time		
145 SEM VOA	1000	N	Her par		MIST		9930		
144 DETRO HYDRO	1000		H2804 pH<		BER	_	470		
14M worans	200		HNOS PHY				770		
12M FILLER META	15 CO	<u> </u>	HNO pH < 2		PE		131		
Notes (include data on floaters/sinkers with measuring device, well condition, etc.) Mso collected a field blank (930C-150) and a rinse blank (930C-250)									
Mso collected a f	held b	ank (930C-	150) and a ru	nse bland	< (93QC	-250)		
for same set of	parai	neres.	1						
Assumes 30% porosity	Vans	A	Date 2//9	167 No.	CD 441	6			

Arthur D Little	Da	g Well Sampli ata Sheet	ng C	Client US Project F Case No.	1 MEGAE				
Date Sampled: 2-18-9		Y: ELUNG NO P/NAJ 6	H 50 4	IN LOC	CATION				
Depth to Water: 5.5. O2 Zo.9 LI Measuring Point: Black	EL 060	PID 0.0		\$					
Equipment: bak pump, TEFLON BAILER									
WELL VOLUME (* use appropriate values in table for each code letter) V well Depth Screen Bottom Depth Water (well) F. 5. 5 ANNULAR VOLUME (ASSUME 30% POROSITY)									
V annulus Depth Gallons of Water V annulus Depth Gallons of Water (annulus) F. 64 X [(15.9 - 5.8)] = 6.98									
WATER TO BE REM(Gallons of Wa (well) [(6.9		er Removal Multipler] x 5 =	Total Gallons be Remove		Actual Gallons Removed				
MEASUREMENTS Well Purging Number of Gallons Removed	pH Conduct 6.07 //6	4 6.3	Turbidity 459 140	Well V well 1.5" 0.10gal/ft 2" 0.17gal/ft 4" 0.66gal/ft	Annulus* dia V annulus 4.0 0.29gal/ft 6.5 0.46gal/ft 7.25 0.59gal/ft 7.75 0.69gal/ft 8.25 0.79gal/ft 8.25 0.64gal/ft 10.25 1.06gal/ft 12.25 1.63gal/ft				
Post Sampling	5.64 .10	3 4.7	175	6" 1.5gal/ft	12.25 1.41gal/ft				
SAMPLING Sample ID Analysis IMOBOZYV VOA 2YS SEM VOA ZYH TEGRO HYPRO 2YM METALS 2ZH HUTERED META	Volume Filter (ml) (Y/N 40		19. 4. 4. 40	ontainer MBER MBER MBER DPB PE	Time /03D /03D /03% /070 /03%				
Notes (include data on flo	paters/sinkers with n	neasuring device, well	condition	ı, etc.)					

	Monitor	ing V	Vall Campl			TA-MU-3				
Arthur D Little	Monitor	_	Client USAEL							
						Project F1 MEADE				
					Case No.	67069				
Pate Sampled: 7-18-93	Sample	1 By: FLIE	ede jon ettinam	000 4444	אן נהסא LOC	CATION				
Depth to Water: 4-70'	Total D	epth:	15.89	1 7	1 0,					
O ₂ 20-9 LEL 000 PID 0.0										
Measuring Point: DIVBLE NOTCH TOP OF PISER										
Equipment: My INTERFAC	Equipment: MY INTERFACE PROBE, TETLOW BALL									
WELL VOLUME (* use				de letter)						
V well	Depth Screen		Depth Water		lons of Water					
	[(15.9		4-7)]=[-	(well) 7-39]				
ANNULAR VOLUME (ASSUME 309	% POR								
			Depth	Gal	lons of Water					
V annulus v.64	Depth Screen	Bottom -	Bottom of Seal)]= [(annulus) 4.98					
WATER TO BE REMO				W-4-1 G-11-						
Gallons of Water Gallons of Water Removal Total Gallons to Actual Gallons (well) (annulus) Multipler be Removed Removed										
[(7.4	+ 7.0)]	x 5 = [72		85				
MEASUREMENTS					Well	Annulus *				
Well Purging Number					V well	dia V annulus				
of Gallons					1.5" 0.10gal/ft	4.0 0.29gal/ft				
Time Removed		ductivity	Temperature	Turbidity	U.Togasht	6.5 0.46gal/ft				
1000 85	5.04	1111	6.3	> 799	2"	7.25 0.59gal/ft				
					0.17gal/ft	7.75 0.69gal/ft 8.25 0.79gal/ft				
						8.25 0.64gal/ft				
					4" 0.66gal/ft	10.25 1.06gal/ft				
Post Sampling	5113	105		>999	6"	12.25 1.63gal/ft 12.25 1.41gal/ft				
		103		7131	1.5gal/ft					
SAMPLING										
		ltered				=1				
Sample ID Analysis	(ml) (1)	Y/N)	Preservation		ontainer Ansex	Time				
345 SEM VIA	1000	N			ngen	1010				
343 PETRO NYMEA		N	42504 pHS2		nsex	1010				
37M METALS 32M FILELED METALS		<u> </u>	HNOS PH < 2		IVE	1010				
DELL PILIPARE ME (AL)	5 00		HNOS PHYZ		ME	10/0				
Notes (include data on floaters/sinkers with measuring device, well condition, etc.)										
			- ,							
200										
Assumes 30% porosity	^ /									
Signature 9PN	and the		Date 2/18/9	7 No	of Bottles	6				

Appendix C: Helicopter Hangar Area Field Forms

Appendix C-1: Helicopter Hangar Area Soil Boring Logs and Monitoring Well Installation Logs

Date Start 1-24-93 Date Complete 2-1-95 Drill Method Hollow Stem Autic Hole Diameter 7. 1' Casing Size 6" 10 4.5. Aug Drilling Additives None Boring Depth 20' Geologist Gn Naumton Sampling Method 2*x2' solit spend, 140 4 44male 130" Depth Sampling Method 2*x2' solit spend, 140 4 44male 130" Depth Scale in Type and number Feet Type and number -0.0 -1.0 550 1 1.0 1.2 1.3 1.4 1.5 1.7 1.7 1.7 1.7 1.7 1.7 1.7	(E9) E	Project FT. MESDE Case No. 67069	ing Log							
The mumber and number and property of the point of the po	⊕ grain size,	ESCRIPTION (Munsell System), grain size,	STEM AVLER SILE DRILL ATV B-53 S NONE AUCHTON HAMMER, 30" DROP GEOLOGIC DE Livified Soil Class ID. color	Date Complete 2-1-95 Hole Diameter /- / Type Of Rig war. Casing Size 6" 10 H.S. Aug Drilling Additives. Boring Depth 20' Geologist G. A. Sampling Method 2"x2' SPLIT SPOIN, 140 IL Scale Type Blows Total Organics						
-1.0 550 0.0.2.1 1.3 19 2.4 LAMERAGE OF MODERATE REDDISH BROWN SHE AND MODERATE VELLOWICH BROWN SHE AND MODERATE VELLOWICH BROWN SHE PROBLY SOLTED, DRY, LOOSE ASPHALT STAINS AND ODER DIFFICULT TO CALL NATIVES SIL BECAUSE ASPHALT STAINING AND GRAVERS. -2.0 -4.0 -5.0 -6.4 5502 5-7 1.4 15 2.0 16 16 16 16 16 16 16 1	description	eneral stratigraphic descript	(unusual odor or sheen), and ge	-	6"	Recovery	Interval	and	Feet	
-4.0 -5.0 -6.0 -6.0 -6.0 -6.0 -6.0 -6.0 -6.0 -6	IOYR SIY	LOOSE 10YR ST DODOR TIVE SILL BECAGE OF	LAYERS OF MODELLA AND MODERATE YELD POORLY SOLTED, DRY, ASPHALT STAINS AND DIFFICULT TO CALL NA	2.4	19	1.31.	0.2.2.1		- 	
-6.0 5502 5-3' 1.4' 15 2.0 POORLY SOUTED, DZY, ACMEDIUM OF	-								-	
	2 5/4 - ENSÉ _	ERANEUS Y GEMEDIUM DENSE	PODRLY COLTED. DZ	2.0	14	1.4'	5-7'	3502	- -6.0	
	-								- -8.0 - -9.0	
-1.0 -1.0	et, loase -	LY SORTED, WET, LOW	[GP] SAND, SILT, AND CENTER SUB ANGULAR, DO DES	6.0	25 27	0-9	10.12'	5503	- u.o	

Artlur P Little

Soil Boring Log Continuation Page

Boring No.HHA
Client
Project
Case No.

Scale in Type Type and Interval Recovery Per Granics (ppm) 1/40							Case No.
Type and interval Recovery Per Organics organics			SAMPLE		·		GEOLOGIC DESCRIPTION
Feet and number Recovery 6" (ppm) (numsual odor or sheen), and general stratigraphic description (numsual odor or sheen), and general stratigraphic description (numsual odor or sheen), and general stratigraphic description (special stratigraphic description of the property of the pro							Unified Soil Class ID, color (Munsell System), grain size,
Indianal odor or sheen), and general stratgraphic description Indianal odor or sheen), and general stratgraphic description Indianal odor or sheen), and general stratgraphic description Indianal odor or sheen), and general stratgraphic description Indianal odor or sheen), and general stratgraphic description Indianal odor or sheen), and general stratgraphic description Indianal odor or sheen), and general stratgraphic description Indianal odor or sheen), and general stratgraphic description Indianal odor or sheen), and general stratgraphic description Indianal odor or sheen), and general stratgraphic description Indianal odor or sheen), and general stratgraphic description Indianal odor or sheen), and general stratgraphic description Indianal odor or sheen), and general stratgraphic description Indianal odor or sheen), and general stratgraphic description Indianal odor or sheen), and general stratgraphic description Indianal odor or sheen), and general stratgraphic description Indianal odor or sheen), and general stratgraphic description Indianal odor of sheen), and general stratgraphic description Indianal odor of sheen), and general stratgraphic description Indianal odor odor odor odor odor odor odor odo			Interval	Recove			corting, moisture, compaction, indication of contaminants
18.0 18.0	Feet				0	(ppm)	(unusual odor or sheen), and general stratigraphic description
18.0 18.0	-13,0						-
150 15-17 14' 14 14 150 light brown, psorty seried medium to continue 12 15 15 15 15 15 15 15							<u> </u>
150 15-17 14' 14 14 150 light brown, psorty seried medium to continue 12 15 15 15 15 15 15 15	Γ.,						<u></u>
SSON 15-17 .4" 14 9 12 13 14 9 15 man; peorly sorted medicants corumae. 15 15 15 16 16 16 16 16 16 16 16 16 16 16 16 16	-14.0			1			l .
SSON 15-17 .4" 14 9 12 13 14 9 15 man; peorly sorted medicants corumae. 15 15 15 16 16 16 16 16 16 16 16 16 16 16 16 16	L						H
SSON 15-17 .4" 14 9 12 13 14 9 15 man; peorly sorted medicants corumae. 15 15 15 16 16 16 16 16 16 16 16 16 16 16 16 16	145						(AIV)
- (4.) -	-120	5504	15-17	ىل.	1		(60) Light brown, poorly sorted medurate course
- (4.) -	 -		., ,,	'	, , ,	OPPA	Dand and a shorwarded shared wet median
- (4.) -	16.0				1 9		Can and Common of June 1, 100 miles
					12		una
	-				17		
	-172			ļ			
-4.5 -24	L						· · · · · · · · · · · · · · · · · ·
-4.5 -24	F		*				i
-w -u -u -u -u -u -u -u -u -u -u -u -u -u	- [8.0]						
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Artiur D Little

Monitoring Well Design

Boring No. HHA-6
Client USAEC
Project For MEADE
Case No.

	2-1	-93 (WY)					Case No.		
Date	Start 1-29		Comple	te 2-1-91	Hole D	iameter /,/	Casing Size 6"		
Contractor ATEC Geologist G. Nauthton, M. Greonwa									
Drill	Drill Method HOLLOWSTEM AUGER Boring Depth 20"								
Type	Of Rig M	BILE DRILL	ATV E	-53	Grout method				
Datu		ble notch			Developmen	t Method To BE	EVELOPED		
Notes									
Scale in Feet	Scale Type Total			Constructio — Stratigrap Annulus Well		Construc	tion Specifications		
-0.0 -1.0 -2.0 -3.0 -4.0 -5.0 -4.0 -3.0 -4.0 -3.0 -4.0			O.13' below	PVC RISER	(See Boring Log for detail)	Elevation Top Of Elevation Ground (survey (depth) Type of Surface Casis Type Of Riser Pipe LD. Riser Pipe Diameter Of Bord Type Of Backfill Type Of Seal Pured Depth To Top Of Type Of Sand Pac Depth To Top Of	chole 1.1' NA Cold Nd. Chips-beatonthe Seal 3' Ck Silica Guarta Sand Sand Pack 6' PVC 17-7' Of Well 17'		

Arthur D Little			Monitoring Well Design (Continuation Page)				Boring No.HHA- Client USA & C Project Fort Myde Case No.		
Scale in Feet	in Type Total		Well Construction Diagram Stratigraphy Annulus Well			Notes and Comments			
	питост	(PP)	V V						
_10.0				FI			- 		
_1.0				1.11			_		
- 1z.∂				-			_		
••				=			_		
_ts.o				7					
_14D				2			-		
- -15.0				327			-		
- 14.0			32	1911 Pre screen			_		
-		·	Sand	111			<u>.</u>		
17.0 -			1 1		,		-		
_181 _			GIAC	A1#C			_		
_12.0							_		
20.8							<u>-</u>		
•							_		
-		•							
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-							-		
_							-		

Appendix C-2: Helicopter Hangar Area Monitoring Well Development Logs

	Monitoring Well	Well No. HHA MW-6							
Arthur D Little	0	Client USACC Project F1 MEADE							
	Development Data Sheet	Case No. 67069							
Date Developed: 2/18/95	Developed By: G. Novemon E. FRIEDEUM								
Depth to Water: 8.02	Total Depth: 17.03	Road	CATION SI						
	EL 85% HNu 6.4	Parking	FILE						
Measuring Point: V- Note	101 bf	以外一刻							
Notes:		(Z) (B)							
WELL VOLUME (* us	e appropriate values in table for each code letter	•)							
V well	G. Depth Screen Bottom Depth Water	allons of Water (well)							
-66	x [(17.03 - 8.02)] =	5.99							
ANNULAR VOLUME	(ASSUME 30% POROSITY)								
V annalus	Depth G Depth Screen Bottom Bottom of Seal	allons of Water (annalus)							
1-06		14-87							
WATER TO BE REMO	OVED								
Gallons of Water	Gallons of Water Removal be Removed	AC	tual Gallons Removed						
(well) -	$\begin{array}{c} \text{(annulus)} \\ \text{(4-17)} \end{array})] \times \begin{array}{c} \text{Multipler} \\ \text{(5)} \end{array} = \begin{array}{c} \text{(20.30)} \\ \text{(30)} \end{array}$		ک /						
MEASUREMENTS		Т	ABLE						
		Well	Annalus *						
Number of Gallons	122	V well	dia V annalus 6.5 0.46gal/ft						
Time Removed	pH Conductivity Temperature Turbidity	2"	7.25 0.59gal/ft						
1305 0.0 gallons 50	6.45 .490 11.9 7999	_ 0.17gal/ft	7.75 0.69gal/ft 8.25 0.79gal/ft						
1437 100	6.51 .456 11.0 7999								
1456 120	6.53 .494 10.7 7999	4" 0.66gal/ft	8.25 0.64gal/ft 10.25 1.06gal/ft						
		-	12.25 1.63gal/ft						
		- 6" 1.5gal/ft	12.25 1.41gal/ft						
Depth to Sediment: Befor									
Type/Capacity of pump hand baler (double bales)									
Pumping Rate 120 gallons / 111 minutes Recharge Time —									
Time to Develop Well: Start 1305 Finish 1456 Duration 11) minutes									
COMMENTS (include description of water removed)									
H2S=0 ppm DIDread 00 in bocket after 2 balenes DIDread 00 in bocket after 2 balenes water level 10.0 Browthingue 16.3 in cell. (PI)) water level 10.0 Browthingue 16.3 in cell. (PI)) water level 10.0 Browthingue 16.3 in cell. (PI))									
11 " 58.0 is well " " Water leve 8.21 Ecct after baling 1459									
	* Assumes 30% porosity for sand pack								

Appendix C-3: Helicopter Hangar Area Monitoring Well Sampling Logs

Arthur D Little	Monitoring Dat	ng [c	Client USAEC Project FGGM Case No. 64069							
Vate Sampled: 1/20/	Sampled By:	ies	LOCATION fence							
Depth to Water: 5.63	Total Depth:	16.83 \$4.								
		PID 32.2 P	PM :	b	♦ bldq					
Measuring Point: Noc	hedge of	PVC casing		,						
Equipment: Hociba	U-10. Miere	tip Pid		Янле	M-1					
WELL VOLUME (* us	se appropriate values	in table for each co	de letter) Gall	ons of Water						
V well 0.66	V well Depth Screen Bottom Depth Water (well)									
ANNULAR VOLUME	(ASSUME 30% P	OROSITY) Depth	Gall	ons of Water						
V annulus	Depth Screen Botton	Bottom of Seal	(annulus)						
WATER TO BE REMO		Removal Multipler 1 5 = [Total Gallon be Remove	ed	Actual Gallons Removed 90					
MEASUREMENTS				Well	Annulus *					
Well Purging Number				V well 1.5"	dia V annulus					
of Gallons Time Removed	pH Conductiv	ity Temperature	Turbldity	0.10gnl/ft	4.0 0.29gal/ft 6.5 0.46gal/ft					
1615 0	pll Conductiv	<u>q</u> <u>6.9</u> -	308	2"	7.25 0.59gal/ft 7.75 0.69gal/ft					
1845 90	(0.9) 0.30	9.3	80	0.17gal/ft	8.25 0.79gal/ft 8.25 0.64gal/ft					
				4" 0.66gal/ft	10.25 1.06gal/ft					
Post Sampling		- 49	93	6"	12.25 1.63gal/ft 12.25 1.41gal/ft					
1900 90+	6.71 0.30	7 4.8	10	1.5gal/ft						
SAMPLING										
Sample ID Analysis HHNEH-1 VOC SVOC Metals PHC	Volume (ml) (Y/N) 2 x 40 mL	Preservation HCJ ICE HNO3 HCI	q q q	Container Lass VIQ I Lass -DPE Lass -DPE	Time 1830					
Metals	500 mL Y	HNO3								
Notes (include data on floaters/sinkers with measuring device, well condition, etc.) Strong odor, water unitally black, turned gray; sheen, broken syringe glass in bailer; drummed purge water Assumes 30% porosity breathing space PID = bkg										
Signature Doo	thy flape	Date \ /20	94 No.	. of Bottles	<u>(o</u>					

Depth of screen bottom derived from total depth

Λrthur D Little	Monitoring Well Sampling Data Sheet				Client USAEC Project FGGM Case No. 67069		
Date Sampled: 1/20/ 9시	San	pled By:	Vesper 16re	enwood	AN LOC	CATION	
Depth to Water: 1.9'	Tota	al Depth:	16.59		sence	4	
O ₂ LE			ID 0.2 ppn		*	€ bldq	
Measuring Point: North	redge	of ca	sing		HAEH- 2		
Equipment: Hariball	1-10 M	iccotic	, Pid				
WELL VOLUME (* us	se appropria	te values in	table for each c	ode letter)	ons of Water		
V well		reen Bottom	Depth Water		(well)		
0.66 gal /St			7.9 ft.]] = [<u>@</u>	17.01		
ANNULAR VOLUME	(ASSUME	30% POF	ROSITY)	C-11	ons of Water	•	
V annulus		reen Bottom	Depth Bottom of Seal		(annulus)		
1.06 gal/4	x [(11.	25ft	08.25 St.]=[10	.40 gal		
WATER TO BE REMO	er Gallor	ns of Water	Removal Multipler	Total Gallon be Remove	ed	Actual Gallons Removed	
[(6.17	+ 10.	60)	x 5 =	B 3. B 4	Well	Annulus *	
MEASUREMENTS Well Purging					V well	dia V annulus	
Number of Gallons		•			1.5"		
Time Removed	5.88	Conductivity	Temperature	Turbidity	0.10gal/ft	4.0 0.29gal/ft 6.5 0.46gal/ft	
0945 0	3.00	1.58			2"	7.25 0.59gal/ft 7.75 0.69gal/ft	
1240 90	6.31	0.104	10.6	>900	0.17gal/ft	8.25 0.79gal/ft	
					4"	8.25 0.64gal/ft 10.25 1.06gal/ft	
					0.66gal/ft	12.25 1.63gal/ft	
Post Sampling 40+	6.04	0.094	10.5	7999	6" 1.5gal/ft	12.25 1.41gal/ft	
SAMPLING							
	Volume	Filtered	Preservation	C	ontainer	Time	
Sample ID Analysis	(ml) 2 × 40mL	(Y/N) N	HCI		G	1245	
SYOC	1000	N	<u>ice</u>		<u>G</u> P		
Metals .	1000	N N	HC1		÷		
Metals	500	<u> </u>	HNO		P		
Notes (include data on floaters/sinkers with measuring device, well condition, etc.) ground water initially black, cleared later							
* Assumes 30% porosity	A N: 11		,				

Signature Dorothy & Vapu Date 1/20/94 No. of Bottles 6

Artlur D L	ittle	Monitoring Well Sampling Data Sheet				Case No. 6	HAEM-3 SAEC SGM 1069
Pate Sampled: Depth to Water: O ₂	/20/9 ² 8.17 LE	St. Tot		Cocq IN DS	Face)	AN LOC	HHAEN-3 bldg
Measuring Point: Equipment: How WELL VOLUM	riba L	e appropria	Microtit	Depth Water	de letter)	ons of Water	
ANNULAR VO	LUME annulus	(ASSUME	43 - 30% POR creen Bottom 43 -	Depth Bottom of Seal	(ons of Water	
[([illons of Wat (well) チル3	er Gallo	ns of Water nnulus)	Removal Multipler x 5 = [Total Gallon be Remove	d	Actual Gallons Removed 95
of C Time Re	mber Gallons moved	pli 5.88	Conductivity	Temperature	Turbidity	V well 1.5" 0.10gnl/ft 2" 0.17gal/ft	dla V annulus 4.0 0.29gaVft 6.5 0.46gaVft 7.25 0.59gaVft 7.75 0.69gaVft
Pact Campling	15+	6.47	-0. 20E	9.3	59	4" 0.66gal/ft 6" 1.5gal/ft	8.25 0.79gal/ft 8.25 0.64gal/ft 10.25 1.06gal/ft 12.25 1.63gal/ft 12.25 1.41gal/ft
SAMPLING Sample ID A	nalysis	Volume (ml)	Filtered (Y/N)	Preservation	C	ontainer	Time 1700
	ocs Nocs letals letals	2 x 40 1000 500 500	N N N Y	HCI HCI HNO3 HNO3		G G P P G	
Notes (include data on floaters/sinkers with measuring device, well condition, etc.) strong odor, sheen; instally black, clear by end drummed porge water Assumes 30% porosity							
Signature Docothy & Vac pur Date 1/20/94 No. of Bottles 6							

Depth of screen bottom derived from total depth

	I		* ***	i tv	Vell No. 🛏	HA EM-4
	Moni	itoring W	ell Samp	ling 📴	lient US	AEC
Arthur D Little		Data S		I,		3GM
						4069 ATION
.,			ebber 1sto	vei		Holda 1N
Depth to Water: 6.8	3 ft. Tot	al Depth:	5.96		-4 4	Пын
O_2	EL	PI	D		A	4
Measuring Point: Nort	h edge	of PV	C casin	a	oka lot	CHHAEN-4
Equipment: 11 -1	11-17	Dicon	tip Pid			•
WELL VOLUME (* u	se appropria	te values in ta	ble for each c	ode letter)	ons of Water	
V well		creen Bottom	Depth Water		(well)	
0.66	x [(.4	5	6.83])]=[<i>a</i> .:	2.17	
ANNULAR VOLUME	(ASSUMI	E 30% POR	OSITY) Depth	Galle	ons of Water	-
V annulus		creen Bottom	Bottom of Seal		annulus)	
1.06	x [(4	5 -	35])]=[10		
WATER TO BE REMO	OVED	ns of Water	Removal	Total Gallon be Remove		Actual Gallons Removed
(well)	(1	nnulus) . 4 O)]	Multipler =	1.78.93		180
[(23.19	+ 10	.60	^		Well	Annulus *
MEASUREMENTS Well Purging					V well	dia V annulus
Number of Gallons					1.5" 0.10gnl/ft	4.0 0.29gal/ft
Time Removed	5.85	Conductivity	Temperature	Turbidity O•O		6.5 0.46gal/ft 7.25 0.59gal/ft
0830 0	(28	0,428	11.5	_10_	2" 0.17gal/ft	7.75 0.69gal/ft
	10.26	0.453	10.8	7999		8.25 0.79gal/ft 8.25 0.64gal/ft
1150 190					4" 0.66gal/ft	10.25 1.06gal/ft
					6"	12.25 1.63gal/ft 12.25 1.41gal/ft
Post Sampling 190+	6.41	6,456	10.7	7999	1.5gal/ft	
CAMDI INC						
SAMPLING	Volume	Filtered			ontainer	Time
Sample ID Analysis	(ml)	(Y/N)	Preservation			1145
HHREM-4 VOCO	2×40	N	HCI		G G	
SUOCE	1000	· N	HNO2		P	
Metals Netals	500		11		P	
PHC	1000	N	HCI		G	
Notes (include data on floaters/sinkers with measuring device, well condition, etc.)						
prown	initially	, turns cle	icul			
* Assumes 30% porosity			1			
Signature Do	Attan 11.	n Tan	Date 1/20	194 No.	of Bottles	6
Digitatin C DOG	700					

Depth to Water: 4.0 A. Total Depth: 17.82 H. O2 — LEL — PID Rain before Gallous of PVC casing Equipment: Horisa U-10 Miscrafts Program WELL VOLUME (* use appropriate values in table for each code letter) WELL VOLUME (ASSUME 30% POROSITY) V well Depth Screen Bottom O. Lo x (17.22 - 4.0)]= 9.12 ANNULAR VOLUME (ASSUME 30% POROSITY) V annulus Depth Screen Bottom O. Lo x (17.22 - 4.0)]= 9.12 ANNULAR VOLUME (ASSUME 30% POROSITY) V annulus Depth Screen Bottom O. Lo x (17.22 - 4.0)]= 9.12 ANNULAR VOLUME (ASSUME 30% POROSITY) V annulus Depth Screen Bottom O. Lo x (17.22 - 4.0)]= 9.12 ANNULAR VOLUME (ASSUME 30% POROSITY) V annulus Depth Screen Bottom O. Lo x (17.22 - 4.0)]= 9.12 ANNULAR VOLUME (ASSUME 30% POROSITY) V annulus Depth Screen Bottom O. Lo x (17.22 - 4.0)]= 9.12 ANNULAR VOLUME (ASSUME 30% POROSITY) V annulus Depth Water (well) Gallous of Water (annulus) Foreign annulus Depth Water (well) O. Lo x (17.22 - 4.0)]= 9.12 Annulus V well day v annulus 1.5° volume for Gallous Annulus V well day v annulus 1.5° volume for Gallous Annulus Depth Water (annulus) Time Annulus One of Gallous An	Artlur D Little	Monitoring Well Sampling Data Sheet			ing c	Client VS Project FC Case No. (.4069
Measuring Point: No dedge of TVC casing Ptq	Depth to Water: 4.0	ff. Tota	al Depth:]:	1.82 ft		↑N LOC. - -	-
V well Depth Screen Botton Depth Water Gallons of Water (vert) P.	Measuring Point: Nor Equipment: Horiba	th ed	ge of Microt	PVC cas	ing T		⊕ H##
Note Note	V well 0.66	Depth Sc x [(17. (ASSUME	Recen Bottom	Depth Water		(well)	
MEASUREMENTS Well Purging Number Of Gallons Removed Pli Conductivity Temperature Turbidity O.10gal/ft 0.0 0.29gal/ft 0.10gal/ft 0.09gal/ft 0.10g	WATER TO BE REMO	x [(14 OVED Gallor	ns of Water	7.82	Total Gallon	2.60	Removed 100
100 100	MEASUREMENTS Well Purging Number of Gallons Removed	рН (0.33	Conductivity O.289		283	V well 1.5" 0.10gal/ft 2"	dia V annulus 4.0 0.29gal/ft 6.5 0.46gal/ft 7.25 0.59gal/ft 7.75 0.69gal/ft
Notes (include data on floaters/sinkers with measuring device, well condition, etc.) Notes (include data on porosity Notes (include data on porosity	Post Sampling 100+			8.1	267	0.66gal/ft	10.25 1.06gal/f0 12.25 1.63gal/f0
dor; water orange/rust through most or sampling drummed purge water *Assumes 30% porosity	Sample ID Analysis HHREN-S VOC. SVOC. Metals	(ml) 2×40 1000 500	(Y/N) - N - N - Y	HCI LCE HNO3 NNO3		6 P P	1730
Signature Prother Votes Date 120 94 No. of Bottles 6	drummed Put	rqe wat	e/rust the	rough most	- San	pling	[0

Depth of screen bottom derived from total depth

Arthur D Little		Data S	ell Sampl heet bber /stove	ing <u>C</u>	lient US roject F(ase No. L	JEC GH	
Depth to Water: 8.06 ft. Total Depth: 16.79 ft. O2 — LEL — PID 28.2 ppm Measuring Point: North edge of PVC casing Equipment: Horiba U-10, Hierotip Pid WELL VOLUME (* use appropriate values in lable for each code letter) Gallons of Water Gallons of Water (well)							
V well Depth Screen Bottom Depth Water (Well)							
WATER TO BE REMOGallons of War (well) [(5.46) MEASUREMENTS Well Purging Number of Gallons Removed 1425 0 1500 45 The Respondence of Sampling 85+	ter Gallo	Conductivity O.403 O.428	Removal Multipler x 5 = Temperature 10.7 11.8 8.5	Turbidity 87 344	<u>i</u>	Actual Gallons Removed S S Annulus dia V annulus 4.0 0.29gal/ft 6.5 0.46gal/ft 7.25 0.59gal/ft 8.25 0.79gal/ft 8.25 0.64gal/ft 10.25 1.06gal/ft 12.25 1.41gal/ft 1.41gal/ft 1 S 1 1 1 1 1 1 1 1	
SAMPLING Sample ID Analysis HHA-6 VOC S VOC Metals Hetals PHC Notes (include data on final strong code of rummed) * Assumes 30% porosity Signature Data	purae i	n; clear e	Preservation HCI ICE HNO3 HNO3 HCI Pring device, we have to me	rell condition		Time 1550	

Depth of screen bottom derived from total depth measurement.

Appendix C-4: Helicopter Hangar Area Surface Water Sampling Logs

Λrt	hur	D	Litt	e
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Surface Water/Sediment Sampling Data Sheet

Date 1	121/94.
Client	USAEC
Project	FGGM
Case No.	

	Sampii	ng Data S	neet		2010	
LOCATION				Case No.	7069	
LOCATION Sampling Location Discr	ription HHA/LiM	. Patwent R	wer H	HASWISE	=-1	
Type Of Water Body						
Channel Width	Channel Dep	th	Est. Flow			
Discharge Points (YN) Location						
Odors, Surface Sheen _	rone.					
LOCATION DIAGR	AM (Indicate orientat	ion, sampling loca	tions, discharge/	recharge points,	etc.)	
			-		$\stackrel{N}{\longrightarrow}$	
	OTTEN.	8		- downsty	eam of	
1-1	70-	HHASW	SE-	all outfi	alls except	
HHM	With 250.	7		one ma		
	Ŋ					
	- 4		· · · · · · · · · · · · · · · · · · ·			
SAMPLING PROCE		51ha 12-10				
Equipment Used (Calibr Solvent 1 Used	ated Y/N) Solvent	2 Used		_ Other		
Decontamination Proced	201.011					
DI Water Rins		er Rinse	Detergent W		Other	
Solvent 1 Rins Solvent 2 Rins		er Rinse	DI Water Ri	nse 🔼		
Solvent 1 Rins DI Water Rins					Į.	
GROUND WATER C		'IC				
TEMP pH	COND	D.O.	REE CLT Y/N	TURB	TIME	
0.7 6.92	0.590	11.83		128	1600	
SAMPLING		VOLUME	FILTERED			
SAMPLE MA	TRIX METHOD	(ml)	(Y/N)	PRESERV.	TIME	
HHASW-1: VOCS /	ta Grab	2×46	<u>N</u>	HCI	1600	
: SVCs : Metals		100b 500		HNO		
: PHC	V	1000		HCI		
HHASE-1: VOCS Sed	Composite	2 ounces		100		
Metals		8				
	7 9	X				
Start of Start						
NOTES - Numerous	s outfalls were	e noted fro	m the w	WTP up	ing of	
of the s	s outtails were sampling point les and in ac ent blank 946	ouble alo	res alona	the rive	er.	
- eau am	ent blank 946	K-287 co	lected of	auger/bow	Ispoon afeli	
Signature Tration	11-24	Date \1	21/94 No.	Of Bottles	q T	

			100
\mathbf{A}	rthu	 	- 10
12	ruu		uc
	-		

Surface Water/Sediment

Date	1/21/94	
Client	USKEC	
Project	F66M	
Case No		

Arthur D Little	Sampling Data		66M	
	. 0		Case No. (e 7069
LOCATION Sampling Location Discri	otion HHA/Little Flooduxent	River HH	ASW/SE-	· 2
Type Of Water Body				
Channel Width	Channel Depth O. 45	Est. Flow_		
Discharge Points (Y/N) L	ocation			
Odors, Surface SheenC	lusclared (organiqueh) f	rom side s	neam	
LOCATION DIAGRA	M (Indicate orientation, sampling l	ocations, discharge/r —	echarge points,	etc.) N
discolor, soi	ne foam HHASWISE-2	-		
Z#TT	170			
	sity, oran	qe flowing in	n (consis of HHA are	a. Bource un
SAMPLING PROCEI				
Equipment Used (Calibra	ted Y/N) Horiba U-10		Other	
Solvent 1 Used Decontamination Procedu	Solvent 2 Used		_ Other	
DI Water Rinse	DI Water Rinse	Detergent Wa		Other
Solvent 1 Rinse Solvent 2 Rinse	Solvent 1 Rinse DI Water Rinse	DI Water Rin	ise	
Solvent 1 Rinse DI Water Rinse				
GROUND WATER CI				
TEMP pH	COND D.O.	FREE CL ⁻ Y/N	TURB	TIME
1.2 7.04	1,29 19,99		90_	1500_
SAMPLING	VOLUME	FILTERED		
SAMPLE MAT	RIX METHOD (ml)	(Y/N)	PRESERV.	TIME
HHASW-2: YOUS A	9 <u>Grab</u> 2×40		HCI ICE	1500
svos <u>netab</u>	500		HNOZ	
PHC +	4 1000	V	Hel	
HHASE-2: NOG Sedu	men Grab 2 ounce	s <u>N</u>	ice	1500
<u>svoc</u> s	Composite 8			
PHC +	4 8		<u> </u>	
NOTES can le call	and a lang adap of du	scalaged Or-	ea.	
NOTES sample coll	eded along edge of du	200000		
Signature Daothy A	N Date	1/21/44 No. (Of Bottles	9
Signature Vocotive	voo pare	101		

Arthur D Little

Surface Water/Sediment Sampling Data Sheet

Date	1/21/94	•
Client	USAEC	
Project	F66H	
Case No	0. 67069	

	Sampling Data Sheet	Project FG6M				
		Case No. 67069				
Type Of Water BodyC Channel Width	Sampling Location Discription _HHA/Little Paturent River HHASW/SE-3 Type Of Water Body Channel Depth L5ft Est. Flow Discharge Points (YN) Location					
LOCATION DIAGRA	M (Indicate orientation, sampling locations, discharge	/recharge points,etc.)				
WHHASW/SE-3 Outfall Outfall						
SAMPLING PROCEDURE Equipment Used (Calibrated N) HORIBA U-10 Solvent 1 Used Solvent 2 Used Other Decontamination Procedures Used DI Water Rinse Solvent 1 Rinse Solvent 1 Rinse Solvent 1 Rinse Solvent 1 Rinse DI Water Rinse DI Water Rinse DI Water Rinse DI Water Rinse DI Water Rinse						
GROUND WATER CH	FREE CL					
TEMP pH 0.78	COND D.O. Y/N	TURB TIME 1200				
HHASW-3 (VOCS) AC (SVOCS) (NeH) (PHC) (PHC) (NeH) (NeH) (NeH) (PHC) (NeH) (PHC) (PHC) (PHC) (NeH) (PHC) (NeH) (NOTES Sample (aqu	iment Gotab 202 Composts 402 402 402 402 Geous) collected approx 100 ft down reperator. Sectiment collected about	tale board weeks.				
Signature Doorly	Date 1/21/94 No.	Of Bottles				

Arthur	DL	itt	e
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Surface Water/Sediment

Date	1/21/94	•
Client	USAEC	
Project	FGGH	
Case No	. 67069	

Arthur D Little	Sampling Data Sheet	Project FGGM Case No. 67069
Type Of Water Body OV	Channel Depth <u>0.5 fl</u> Est. Flow ocation discharge from unknown and	w
LOCATION DIAGRA	M (Indicate orientation, sampling locations, discharge	ge/recharge points,etc.)
HHASY		Howing due to ice
SAMPLING PROCED Equipment Used (Calibrat Solvent 1 Used Decontamination Procedu DI Water Rinse Solvent 1 Rinse Solvent 2 Rinse Solvent 1 Rinse DI Water Rinse	ted (VN) Horbo U-10 Solvent 2 Used ————	
GROUND WATER CH	ARACTERISTIC COND D.O. Y/N 0.605 14.13	TURB TIME
SAMPLING SAMPLE MATI HHASW-4 (VOCS) (SVOCS) (Met) (PHC) HHASE-4 (VOCS) (SVOCS) (Met) (PHC) (SVOCS) (SVOCS) (PHC) (PHC) (PHC) (PHC) (PHC) (PHC) (PHC) (SVOCS) (SVOCS) (PACT) (PHC) (SVOCS) (PACT) (PHC)	Grab 40 x 2 N 1000	PRESERV. TIME HCI 1300 ICE HNOS HCI LCE
Signature Dootly		

Arthur D Little	Surface Water/Sedin Sampling Data Sh	Chem ODAO
Type Of Water BodyC Channel Width Discharge Points (2)N) Lo	•	- discharge flowing Est. Flow — discharge flowing the oil-water seperator
LOCATION DIAGRA	M (Indicate orientation, sampling location)	ons, discharge/recharge points, etc.)
	###AGW-5 ## frozen ice duscharge pipe	
Equipment Used (Calibrat Solvent 1 Used	ted(YN) Horiba U-10 Solvent 2 Used	Other Detergent Wash DI Water Rinse
GROUND WATER CH TEMP pH 0.6 6.80	FR	
Discharge Points (N) Location Just down from auffall from the oil-water seperate Odors, Surface Sheendischargecolored orange		
NOTES No sedume	nt sample was collected	(HHASE-5) because

Signature Dootly & Von per

Date 1/21/94 No. Of Bottles

Appendix C-5: EMO Well Data for the Helicopter Hangar Area

om Faviron Hind Office - somple atr - NOV site -not-sure it in that IRDN'S CHUCK COLONA, (HHACH=4 tox the purpose of monitoring the groundwater will be Leteres well #6 (well next to well C.C. FRANK KING KODE TRANIC

JONES WELL DRILLING, INC.

3700 RUSH ROAD IARRETTSVILLE, MARYLAND 21084 Jan 92. Lechons

ORING LOG #1 Application No. ________ Anne Annotel ______ Airfi AA-88-3442 Permit No. ... ale Drilled: 11-02-89 · Helicopter Hanger Airfield Riocation Bldg: 90 A Helicopter Hanger wner Ft. Meade/C:W. Over Address _ Cuttings Sampling Methou __)rilling Method ___ Augered Total Depth 16' 10" lole Diameter _____ Diameter 4" Length 1: 10" Casing: Shur-seal flush joint sch. 40 PVC Type _ Slot __620 __ Diameter __4" __ Length __15! 0"
Casing Seal ____ Bentonite ...
Geologic Formation _____ Potomac Group ____ creen: Shur-seal flush joint sch. 40 PVC Type _____shur-sa stayer Pack Size _ Static Water Level -: #1 8' 10'' IDENTIFICATION DEPTH SAMPLE NUMBER WELL DESIGN BLOWS PER 6" ON SAMPLER OF SOILS/REMARKS . SURFACE $0^{1} - 6^{11}$ · Brown dirt · 6" - 31 Sand CHITTE HAME Gravel 31 -51 Sand & gravel 51 - 111 Brown/red clay 11' - 14' Screed 14' - 17' White clay 20' 30'

JONES WELL DRILLING, INC. 3700 RUSH ROAD JARRETTSVILLE, MARYLAND 21084

JURING LOG				Perm	nit No.	ÁA-88-34	43	
		lication No County	Anne Ar	undel	_Use	Monito	ring	
)ale Drilled 1		COUNTY - Helicop	ter Hanger					
ocalion B)wner Ft. Mea	Idg: 90-A:	· uerran	_Address _	•				
)wner : Ft. Mea	0e/C:Ws Over	<u></u>		Sampling Methou _		ttings	-17' 3"	
Orilling Method Hole Diameter	11"				101a	Depth_	17 5	
Hole Digitierer -				Diameter	Δu	Localh	21.3"	
Casing: S Types	hur-seal flush	joint sch 4						
Screen: Stim		40 DU	c · Clot	Diameler	- 4 ¹¹	Length _	15' 0"	
TUND JUIL	seal flush join	c sai 40 PV		ing Cool Dr	HUJII UZ.			
Gravel Pack Size Static Water Lev	e - #1 /el 9'2"		· Geo	logic Formalion	· Po	tomac Grou	D	
Static Availet Fed	/el							
DEPTH CAMPLE	BLOWS PER E"	WELL		IDEI OS SO	NTIFICATION ILS/REMARKS			
DEPTH BELOW SAMPLE SURFACE NUMBER	ON SAMPLER	DESIGN		· 0r 30	ICS/NEWCOMOS			
SURPACE		Casing	01 - 611	· Brown dirt-	•			
		160	6" - 21	Soft brown	•		•	
		2-	21 - 41	Gray clay (sl	ight films	١.	•	
7		-	4' - 6'	Gravel:	Ight fulls,	'		
				Sand & gravel			•	
		1	6' - 13'	San a graver				
		creen	13:- 17' 6"	Brown clay	XXXXX	<i>/</i>) .	
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TO A E L SECUENCENO L	. STATE OF MARYLAND	45 DAYS AFTER WELL IS COMPLETED
15 30,15 SEQUENCE NO.	WELL COMPLETION REPORT	COUNTY /
THIS NUMBER IS TO BE PUNCHED.	PLEASE PRINT OR TYPE	NUMBER HATEN PERMIT NO.
ST/CO USE UNLIGHT TO THE STATE OF THE STATE	Depth of Well	FROM "PERMIT TO DRILL WELL"
ATF Received D: 1 2 1 9:1-	22 4 5 20	441-1881-5621C
15 15 20	(TO NEAREST FOOT)	
WNER C.W. Over Contracting Corpany/Fo	first name TOWN	Jarrettsville 21084
UBDINISION Fort Meade Bldg. 90-A A	irfield Rd. SECTION	LOT
WELL LOG	GROUTING RECORD WELL HAS BEEN GROUTED WELL HAS BEEN GROUTED	C 3
Not required for driven wells STATE THE KIND OF FORMATIONS	(Circle Appropriate Box)	PUMPING TEST
PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING	TYPE OF GROUTING MATERIAL ACEMENT CM PENTONITE CLAY BC	HOURS PUMPED (nearest hour)
FSCRIPTION (Use . FEET Check .	45 48	PUMPING RATE (gal. per mln. 4
	NO. OF BAGS NO. OF POUNDS 30 GALLONS OF WATER 21	to nearest gal.) METHOD USED TO timer
rown dirt 0 11	DEPTH OF GROUT SEAL (to nearest 1001)	MEASURE PUMPING RATE L
ray clay (petro. odr) 11 3	from 0 ft. to 3 ft. ft. ft. ft. ft. ft. ft. ft. ft. ft.	BEFORE PUMPING
an clay mixed with 3 4	casing CASING RECORD	413111
gravel (strong petro, odor)	types ST CO	WHEN PUMPING TO 22 25
reg clay	(appropriate) STEEL CONCRETE	TYPE OF PUMP USED (for test) A air P piston T turbine
an clay mixed with 6 8. X	below. PLASTIC OTHER	27 27
1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	MAIN Nominal diameter Total depth	C centrifugal R rotary O (describe
gravel (strong petro. coor)	CASING top (main) casing of main casing (nearest foot)	27 below)
xrown clay with fine sand	P L 4 5	J jet (S) submersible
8 30 X	60 61 63 64 68 70	2
7 clay 30 39	OTHER CASING (if used) diameter depth (feet)	PUMP INSTALLED
fay 39 45	H Inch from to	DRILLER WILL INSTALL PUMP YES, No
	S	(CIRCLE) (YES or NO)
The Markey of Joseph Control of the	N. A. S. S. S. S. S. S. S. S. S. S. S. S. S.	IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS
	screen type SCREEN RECORD	EXCEPT HOME USE TYPE OF PUMP INSTALLED
	or open hole ST BR HO	PLACE (A,C,J,P,R,S,T,O)
	appropriate STEEL BRONZE HOLE	CAPACITY: GALLONS PER MINUTE
	pelow PLASTIC OTHER	(to nearest gallon)
	C[2]	PUMP HORSE POWER 37 41
	1 2. DEPTH (nearest fL)	PUMP COLUMN LENGTH (nearest ft.)
	PL 5 45	CASING HEIGHT (circle appropriate box and enter casing height)
	A 8 9 11 15 17 21	LAND SURFACE
	H 2	(nearest foot)
CIRCLE APPROPRIATE LETTER		50 51
A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED	E 3 41 45 47 51	LOCATION OF WELL ON LOT SHOW PERMANENT STRUCTURE SUCH AS
E ELECTRIC LOG OBTAINED	SLOT SIZE (•020, 3	BUILDING, SEPTIC TANKS, AND/OR N LANDMARKS AND INDICATE NOT LESS
P TEST WELL CONVERTED TO PRODUCTION WELL	DIAMETER 4 (NEAREST INCH)	THAN TWO DISTANCES (MEASUREMENTS TO WELL)
HERERY CERTIEY THAT THIS WELL HAS REEN CONSTRUCTED IN	(rom, 3; 10, 46,	77444
ACCORDANCE WITH COMAR 28,04,04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRE-	GRAVEL PACK	XXXXXX
SENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE	FLOWING WELL INSERT	(S)
ERS IDENT. NO. 304	F IN BOX 68 68 0EP USE ONLY	34
-David Kollin	(NOT TO BE FILLED IN BY DRILLER)	Tal
(MUST MATCH SIGNATURE ON APPUDATION)	T (E.RO.S.) W Q	Links Da Co
See Commence of the second	ro⊡, ":	
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework If different from permittee)	TELESCOPE LOG OTHER DATA CASING. 1 INDICATOR	
	DRILLER	
The same of the sa		•

		•	
The state of the s	BORING LOG	· · · · · ·	
		Annikaation No.	Permit No. AA-88-5626
	Well No	Application no	rundel Use Monitoring
	Location Fort Meade	Bldg. 90-A Airfield	Rd.
	Owner C.W. Over/Fort Me	ade Address	Jarrettsville
70-0	Owner C.W. Over/rore no	100,000	
	DESTRUCTION DI ONS DE	R 6" WELL	IDENTIFICATION OF
ING METHOD	DEPTH: SAMPLE BLOWS PE		. SOIL/REMARKS
Augered ·	BELOW NUMBER ON SAMPL	1 10 - 1	t brown dirt
ittings · · ·		1 2개 .	
DIAMETED .		J. J. Hit - 3	gray clay (petro. odor) tan clay mixed with gravel
DIAMETER N			(strong petro. odor)
DEPTH 451		— H 4 - 6	
DET III		6 - 8	tan clay mixed with gravel
G PVC Schedule 4	0 . 10'		(strong petro. odor) x water bearing
ETER 4"	10		
TH 5'		 · ·	
N F-PVC Schedule 4			: /
.020			17HAEM
FR 4"			/ ME!
IGTH 401			(1741)
L PACK SIZE 11	201		
C WATER LEVEL			
7		 	
IG SEAL			
conite/cement			
OGIC FORMATION			•
	30'	 . ₈₋₃	brown clay with fine sand
	30		x water bearing
*1			•
•			
		 - 30 - 3	g brown clay
	40'		
		1 1	
ELL DRILLING, I		39 - 4	6 red clay
(301) 892-8981 office (301) 692-9635 evening (301) 692-6969 FAX	45'		
3700 Rush Road Jamellsville, MD 21084	:		

Appendix D: Inactive Landfill #2 Monitoring Well Sampling Logs

Λrtlur D Little	M	onitoring Dat		ell Sampl heet	ing	Well No. Client Project & Case No.	JAE T. MI	EADE
late Sampled: 2-17-	93	Sampled By:	FRI	EDENSON /N	NOHTON	I'd	CATION	И
Depth to Water: 12.58	3 '	Total Depth:	3	1.61'		27		<u>L2</u>
O ₂ Z1.0 LH	L o	00	PII	0.0		27 (
Measuring Point: BLACK	MAKK	TOP OF	RIS	ER			es An	
Equipment: KECK SUBMIN	SIBLE	PUMP						
WELL VOLUME (* us	se appro	priate values	in ta	ble for each c	ode letter) 		
V well 0. 6 6		pth Screen Botton		Depth Water] =[([allons of Wate (well) 12.5		
ANNULAR VOLUME	(ASSU	JME 30% P	OR	OSITY)				
V annulus		epth Screen Botton		Depth Bottom of Seal	G] =[([allons of Wate (annulus) 13.5	er	
WATER TO BE REMO Gallons of Wa (well) [(\[\sum_2 \cdot S \]		Gallons of Water (annulus) /3.5])]	Removal Multipler x 5 =	Total Gal be Rem	oved	Rem /3	
MEASUREMENTS						Well		nnulus *
Well Purging Number						V well 1.5"	dia	V annulus
of Gallons Time Removed 1545 0 130 130	pH 5.6 5.8	0 .06	0	Temperature /0.5 / 12.4 / 11.4	Turbidity 287 /0	0.10gal	6.5 7.25	0.29gal/ft 0.46gal/ft 0.59gal/ft 0.69gal/ft 0.79gal/ft
Dest Compline						0.66gal	8.25 10.25	0.64gal/ft 1.06gal/ft 1.63gal/ft
Post Sampling	5.7	-3 15	<u>J</u>	11.4	190	— 1.5gal		2002
SAMPLING	Volu			P		Container		Time
Sample ID Analysis II MOOZFYM TOTAL METAN I MOOZFZM DISSONCOME		(Y/N - Y	<u> </u>	Preservation NITELC PH	12 1	L HOPE		1730
Notes (include data on fl well precen with	oaters/s	inkers with n	neasu TH	ring device, w	vell condi	tion, etc.)		
* Assumes 30% porosity	ole.			Data 7 -/3				

				V	Vell No. 🕢	W-28
	Mo	nitoring W	Vell Samp			AEC
Arthur D Little		Data	Sheet		roject 🕶 Case No. 6	
		Compled Ry	1000 1110		LOC	ATION
Date Sampled: 2-17-9		Sampled By: PR	16DENSON/NF 24.47'	NGK (ON	س کال	26
Depth to Water: 9.06		· .				(112)
O ₂ 21.0 LI			D 0.0		11	PENCE
Measuring Point: BLACK						
Equipment: 1.5" 10 TEFU	N BALL	. (B" LENGTH)	- 1- 1-44 om)	NO 44	
WELL VOLUME (* u	se approp	riate values in 1	able for each	code letter) Gall	ons of Water	
V well		th Screen Bottom	Depth Water])]= [(well)	
v.64		24.5 ·		J / J - L		
ANNULAR VOLUME			Depth		ons of Water	
V annulus		th Screen Bottom	Bottom of Sea		(annulus)	
0.64]x [(L	01.5				
WATER TO BE REMO	OVED	allons of Water	Removal	Total Gallor be Remov		Actual Gallons Removed
(well)	7+	(annulus) //· Z)	Multipler = 5	107		110
MEASUREMENTS					Well	Annulus *
Well Purging			•		V well	dia V annulus
Number of Gallons					0.10gal/ft	4.0 0.29gal/ft
Time Removed	5.21	Conductivity	Temperature	Turbidity >999		6.5 0.46gal/ft 7.25 0.59gal/ft
1215 110	5.43	.144	10.4	>997	2" 0.17gal/ft	7.75 0.69gal/ft
					-	8.25 0.79gal/ft 8.25 0.64gal/ft
					4"	10.25 1.06gal/ft
					0.66gal/ft	12.25 1.63gal/f
Post Sampling	5.32	./38	11.1	>999	- 1.5gal/ft	12.23 1.41gau1
CAMPI INC						
SAMPLING	Volume	Filtered				ent.
Sample ID Analysis	(ml)	(Y/N)	Preservatio		Container HDP E	Time / 2/5
IIMODZBYM TOTAL METAL IIHDD 287M DISSOLUED MET			NAMEDH		HDPE	1215
TINOD ZOPIT SUZZ						
Notes (include data on f	loaters/si	ikers with meas	suring device,	well condition	on, etc.)	•
1						
* Assumes 30% porosity			١			
Signature 97	Nam	<u>t</u>	Date <u>2-/7</u>	-93 No	of Bottles	2
/	8					

Measuring Point: BLACK MARK TOP OF 2156K Equipment: 1.5" 10 TEERON BAIL (B'LENGTH) WELL VOLUME (* use appropriate values in table for each code letter) V well Depth Screen Bottom O.C.G. x [(24.7 - 11.1)] = 0.7 3 ANNULAR VOLUME (ASSUME 30% POROSITY) Popth Depth Screen Bottom O.C.G. x [(24.7 - 11.1)] = 0.3 WATER TO BE REMOVED Gallons of Water (annulus) Gallons of Water (well) [(10.3 + 12.3)] x 5 = 1 1 2 3 WELL VOLUME (ASSUME 30% POROSITY) Popth Bottom of Seal (annulus) WATER TO BE REMOVED Gallons of Water (annulus) Gallons of Water (annulus) [(10.3 + 12.3)] x 5 = 1 1 2 3 WELL VOLUME (ASSUME 30% POROSITY) Depth Bottom of Seal (annulus) [(10.3 + 12.3)] x 5 = 1 1 2 3 WATER TO BE REMOVED Gallons of Water (annulus) [(10.3 + 12.3)] x 5 = 1 1 2 3 Well Annulus V well dia 1 1 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	9 /-				
Arther D Little Data Sheet Project Fr. As A Case No. 670 (Case No. 670	1 (1)				
Rate Sampled: 2-17-93 Sampled By: KRIEDENSON / MAJUH704 THE LOCATION The period of Container Major M	25.				
Total Depth: 26.70' Depth to Water: //. 06' Total Depth: 26.70' Depth to Water: //. 06' Total Depth: 26.70' Measuring Point: BLACK MARK TOP OF RISEK Equipment: 1.5" D THERLOW BAIL (B'LENCTH) WELL VOLUME (* use appropriate values in table for each code letter) Veril Depth Screen Bottom OF Callons of Water (well) V annulus Depth Screen Bottom Depth Bottom OF Callons of Water (well) V annulus Depth Screen Bottom OF Callons of Water (annulus) O. 6.4' x [(24.7) - 75] WATER TO BE REMOVED Gallons of Water (annulus) (10.3 + 12.3) x 5 = 71.3 MEASUREMENTS Well Purging Number of Gallons Time Removed PH Conductivity (1.5" of 2.77.7 ITHE Removed PH Conductivity (1.5" of 2.77.7 ITHE Removed PH Conductivity (1.5" of 2.77.7 ITHE Removed PH Conductivity (1.5" of 2.77.7 ITHE Removed PH Conductivity (1.5" of 2.77.7 ITHE Removed PH Conductivity (1.5" of 2.77.7 ITHE Removed PH Conductivity (1.5" of 2.77.7 ITHE REMOVED (
Total Depth: 2 - 17 - 9 3					
Depth to Water: //. 0 G ' Total Depth: 2 G. 70' O2 ZU. 9 LEL 00 / PID 0. Z Measuring Point: BLACK MARK TOP 0F & USEK Equipment: 1.5" D TEFLON BAIL (B'LENOTH) WELL VOLUME (* use appropriate values in table for each code letter) WELL VOLUME (ASSUME 30% POROSITY) Depth Water (well) V vanulus Depth Screen Bottom Depth Water (well) V vanulus Depth Screen Bottom O. 64 X [(2 G. 7 - 11.7)] =					
Measuring Point: BLACK MARK TOP OF RISER Equipment: 1.5" 1D TERLO BALL (B'LENGTH) WELL VOLUME (* use appropriate values in table for each code letter) V well Depth Screen Bottom O.G.G. x [(Z.G.7 - 11.1)] = /0.3 ANNULAR VOLUME (ASSUME 30% POROSITY) Poth Bottom of Seal O.G.Y. x [(Z.G.7 - 11.1)] = /2.3 WATER TO BE REMOVED Gallons of Water (well) (/0.3 + 1/2.3)] x S = /1/3 MEASUREMENTS Well Purging Number of Gallons Time Removed pH Conductivity (A.0) (1.54) O GALDON Time Removed pH Conductivity (2.64) (3.65) (3.79) (1.715) (1.0 GALDON) Time Removed pH Conductivity (2.65) (3.79) (1.715) (1.0 GALDON) Post Sampling (GALDON) (A.0) Post Sampling (GALDON) (A.0) Sample ID Analysis (mil) (Y/N) Preservation (ACRUL GALDON) Sample ID Analysis (mil) (Y/N) Preservation (ACRUL GALDON) Sample ID Analysis (mil) (Y/N) Preservation (ACRUL GALDON) (A.0) Preservation (ACRUL GALDON) (A.0) Container (ACRUL GALDON) (A.0) Container (ACRUL GALDON) (A.0) Container (ACRUL GALDON) (A.0) Container (ACRUL GALDON) (A.0) Container (ACRUL GALDON) (A.0) Container (ACRUL GALDON) (A.0) Container (ACRUL GALDON) (A.0) Container (ACRUL GALDON) (A.0) Container (A.0) (A.0) Container (A.0) (A.0) Container (A.0) (A.0) (A.0) Container (A.0) (A.0	<u>L2</u>				
WELL VOLUME (* use appropriate values in table for each code letter) V well Depth Screen Bottom O. G. C. X. (
WELL VOLUME (* use appropriate values in table for each code letter) WELL VOLUME (* use appropriate values in table for each code letter) V well Depth Screen Bottom O. G. C. x [(
WELL VOLUME (* use appropriate values in table for each code letter) V well Depth Screen Bottom Depth Water (well) V annulus Depth Screen Bottom Depth Water (well) V annulus Depth Screen Bottom Depth Bottom of Seal V annulus Depth Screen Bottom Depth Bottom of Seal V annulus Depth Screen Bottom Depth Bottom of Seal V annulus Depth Screen Bottom Depth Bottom of Seal V annulus Depth Screen Bottom Bottom of Seal V annulus Depth Screen Bottom Seal Depth Bottom of Seal V annulus Depth Screen Bottom Bottom of Seal V annulus Depth Screen Bottom Seal Depth Bottom of Seal V annulus Depth Screen Bottom Seal Depth Bottom of Seal V annulus Depth Screen Bottom Seal Depth Bottom of Seal V annulus Depth Screen Bottom Seal Depth Screen Bottom Seal Depth Screen Bottom Seal Depth Scallons of Water (annulus) Depth S					
V well					
ANNULAR VOLUME (ASSUME 30% POROSITY) Vannulus					
ANNULAR VOLUME (ASSUME 30% POROSITY) V annulus Depth Screen Bottom O. 69 x [(24. コー・コボー)] = 12.3 WATER TO BE REMOVED Gallons of Water (well) (well) (vell) Time of Gallons Time Removed pH Conductivity Temperature of Gallons Time Removed pH (827) (3715) (4.48) (4.48) (4.41) (4.41) (4.41) (4.42) Post Sampling (10 6.41) Post Sampling (10 6.41) Sample ID Analysis Sample ID Analysis (ml) Volume (MI) (Y/N) Preservation Apple 2 Mallons of Water (annulus) Pepth Bottom of Seal (12.53) Actual Gallons to be Removed Removed Publicity (12.53) (12.53) Well Analysis (1.5" 0.10gal/ft 4.0 1.5" 0.10gal/ft 4.0 1.5" 0.17gal/ft 7.75 8.25 9.799 6" 12.25 SAMPLING Sample ID Analysis (ml) (W/N) Preservation Apple 2 Mallons of Water (annulus) (24.73) Apple 2 Mallons of Water (annulus) (25.71) (24.73) Post Sample ID Analysis (ml) (W/N) Preservation Apple 2 Mallons of Water (annulus) (annulus) (annulus) (12.53) Actual Gallons to be Removed Removed Removal Multipler (1.5" 0.10gal/ft 4.0 (1.5" 0.10gal/ft 4.0 (1.25) (1.25) (2.5)					
Vannulus					
Vannulus					
WATER TO BE REMOVED Gallons of Water (well) (10.3 + 12.3) x 5 = 1/3					
Gallons of Water (well)					
MEASUREMENTS Well Annulus Well Annulus V well dia 1.5" 0.10gal/ft 4.0 1.5" 0.10gal/ft 1.5" 0.10gal/ft 4.0 1.5" 0.10gal/ft 4.0 1.5" 0.10gal/ft 1.5" 0.10gal/ft 1.5" 0.10gal/ft 1.5" 0.10gal/ft 1.5" 0.10gal/ft 1.5" 0.10gal/ft 1.0" 0.10gal/ft	allons				
MEASUREMENTS Well Purging Number of Gallons Time Removed PH Conductivity Temperature 7/5 1/5 1/5 6.41 827 8.1 979 2" 7.25 1/5 1/5 1/5 6.41 827 8.1 979 0.17gal/ft 8.25 10.25 1					
MEASUREMENTS V well dia Number of Gallons Time Removed (154) pH (2.48) (1.824) (1.66) (1.59)					
Well Purging Number Of Gallons Time Removed PH Conductivity Temperature Turbidity 79,9 6.5 1.5 0.10gal/ft 4.0 1.5 0.10gal/ft 4.0 1.5 1.7	ulus				
Number Of Gallons Time Removed PH Conductivity Temperature Turbidity Service	V annulus				
Time Removed pH Conductivity Temperature 79/9 2" 7.25 17/5 1/0 6.4/8 1824 10.6 79/9 2" 7.25 8.27 8.1 7.75 0.17gal/ft 7.75 8.25 8.25 9.1 9.10 6.4/1 8.25 10.25 10.25 12.25 9.10 9.10 9.10 9.10 9.10 9.10 9.10 9.10	0.29gaVft				
17/5	0.46gal/ft				
O.17gal/ft 7.75 8.25 4" 10.25 10.25 10.25 12.25 12.25 1.5gal/ft 12.25 1.5gal/ft 1.5gal/f	0.59gal/ft				
Sample ID Analysis Container Conta	0.69gal/ft 0.79gal/ft				
Post Sampling	0.64gal/fi				
Post Sampling 1730 6.41 .846 8.5 >999 6" 12.25	1.06gal/f				
SAMPLING Volume Filtered Sample ID Analysis (ml) (Y/N) Preservation Container 11 M0029 M Total METAL 1400 M MORIL PHONE I	1.63gal/f				
SAMPLING Volume Filtered Sample ID Analysis (ml) (Y/N) Preservation Container 11 M0029 M Total METAL 1600 At NOTAL PHOR 1	1.41gal/f				
Volume Filtered Sample ID Analysis (ml) (Y/N) Preservation Container 11 M0029 M Total METAL 1400 M NOBEL PHCZ IL HOPE I					
Volume Filtered Sample ID Analysis (ml) (Y/N) Preservation Container 11 M0029 M Total METAL 1600 M NOBEL PHCZ IL HOPE I					
Sample ID Analysis (ml) (Y/N) Preservation Container 11 M0029 M Total METAL 1400 At NORTH PHONE I					
II MODZY M TOTAL METAL 1000 A NOME PHOO 10 NOW	Time 715				
	715				
I I MOD 297 MDISSOLUED METAL 1000 Y NITHIC PHUZ IL HOPE	<u></u>				
Notes (include data on floaters/sinkers with measuring device, well condition, etc.)					
WATER AND WELL HAS STRONG SEWACE ODGE.					
* Assumes 30% porosity					
Signature GPNamt Date 2-17-93 No. of Bottles Z					

Signature GPNant

		~	**				2 2 (
			mpling					
Arthur P Little	D	Data Sheet						
			7	- .	7.00		1	
Date Sampled: 2-17-9	3 Sampled I	By: Friedenson	NAUCHTO	7 14		:		
Depth to Water: 18.3	5' Total Dep	th: 31.92'			11	أدم	365	
		PID —				3	0	
Measuring Point: RLACK	MARK TOO D	e riser						
peth to Water: 18.35' Total Depth: 21.92' Depth D								
Edulation 1/2 18 161	se appropriate valu	ues in table for	each code le	tter)				
ANNULAR VOLUME	(ASSUME 30%	POROSITY	7)		CTT/- 4			
		De	թա				ł	
	1 × [(L						-Name	
WATER TO BE REIVIO Gallons of Wa	Ater Gallons of W		val be					
(well)	(annulus)		eler =	21		45		
L \L	<u> </u>				Well	Ann	ulus *	
			•			dia	V annulus	
Number						40	0.20ga]/ft	
	nH Cond	uctivity Temper	ature Turk	idity	0.10gal/it			
1325/2-16-93 0	6.59 15	108 12	1 - 2º	99	2"	7.25	0.59gal/ft	
	6.20		8 >9	99	0.17gal/ft		-	
					•	10.25	1.06gal/ft	
Post Sampling	6.23 1	238 11.	9 >9	199	-	12.25	1.41gavit	
SAMPLING								
	(Olding		tiom	Ca	ntainer	1	Time	
Sample ID Analysis		1 .44	- pH 42	12	HOPE	_		
TIMOSOSYM ISTAL METAL		Y N-TAIC	PHLZ	16	HOPE		245	
Notes (include data on f	loaters/sinkers wit	h measuring de	vice, well co	ndition	, etc.)		-	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	(EX) 0~ 7(6-1	יוט טון אט י	ľ	PID F	ANLA ME	CACIN		
* Assumes 30% porosity		١						
Signature GP	Nangt	Date_	2-17-93	No.	of Bottles			
	X							

					Well No. M	w-3	OD	CI
	M	onitoring	Well Samp	ling	Client US			
Arthur D Little		_	a Sheet	Ü	Project FT			
		2000	a Brieff		Case No. 6			
Pate Sampled: 2-17-9	3	Sampled By:	EHINGWOOD/N	MOTHON	IN DELLE	ATION	I	
Depth to Water: 29.9	9'	Total Depth:	131.99'			3	D 305	
O ₂ LI	EL oc	00	PID —			-		
Measuring Point: BLACK	MARK	TOP OF C	LISER					
Equipment: KECK SUBM	IRSIBVE	PUMP, SAMP	LED WITH TEP	LON BAIL	ER	An	IL2	
WELL VOLUME (* u	se appro	priate values	in table for each	code letter)			
V well		pth Screen Bottom		G	allons of Water (well)			l
0.60]× [([132.0	30.0])]=[67.3			
ANNULAR VOLUME		ME 30% PC	OROSITY)					1
			Depth		allons of Water			
V annulus O. & 4]x [([th Screen Bottom	Bottom of Sea	┧)]= □	(annulus)			
WATER TO BE REMO								1
Gallons of Wa		Gallons of Water	Removal	Total Gall		Actual C Remo		
(well) [(67.3	7+[(annulus) 18.6)]x S =	429	5	43	0	
MEASUREMENTS					Well	An	nulus *	
Well Purging			•		V well	dia	V annulus	s
Number of Gallons					1.5" 0.10gal/ft	4.0	0.29gal/ft	
Time Removed	pH 10.29	Conductiv		Turbidity >999	U.Togabic	6.5	0.46gal/ft	
1325 /2-1843 0 1440 430	5.89	1107	13.3	799	<u></u>	7.25	0.59gal/ft 0.69gal/ft	1
					0.17gal/ft	7.75 8.25		
					= 4"	8.25	0.64gal/ft	
					- 0.66gal/ft	10.25		
Post Sampling					6"	12.25 12.25		-
1445 430	11.14	,493		740	— 1.5gal/ft			
SAMPLING								
	Volum				a		Time	l
Sample ID Analysis	(ml)		Preservation	n 27 / / /	Container HI)PE		1440_	
LINASODZM DISSULUED META		У	NITRIC , OH I	62 14	HUPK	_	1440	
DUPLICATE TOTAL META		~	NITME PHO		HAPE		440	
DIFLICATE AKSOWED META	1 1000	У	NITMIC PHE	-2	LHDPE	- <u>-</u>	440	
-OIDOUSLYM					<u> </u>			1
@IDOUS 12H								
Notes (include data on fi	oaters/si	nkers with me	easuring device.	well condit	ion, etc.)			1
30 GALLONS KEMO	VED O	N 2-16-93	,	PID :	FAULT HOIL	4110~	J	
350 barbons Remove	180 0~	7 2-17-97						
* Assumes 30% porosity	·		1					1
Signature Gr	Nam.	A-	Date 2-/7	-93 N	lo. of Bottles	4		

	T				Well No. 1	ww.	31/7/	1.27	
	M	onitoring	Well Samp	oling	Client US				
Arthur D Little		_	a Sheet	8	Project FT MEADE				
		Dai	la Dilect		Case No. 67069				
Date Sampled: 2-17-9	3	Sampled By:	CRIEDENSON/N	AUCHTON	PN REMUE	ATION	N		
Depth to Water: 12.7	,	Total Depth:			11	į	L2		
O ₂ L	EL		PID			• /			
Measuring Point: BLACK	MARK	TOP OF R	LISER						
Equipment: 1.5" 10 TEST	ON BA	11 /81 LEN	SETH)		2000				
WELL VOLUME (*1	ise appro	opriate values	in table for each	code letter)	Hana af Water				
V well	De	epth Screen Botton			allons of Water (well)				
0.66] x [([29.8	- 12.7	_])]= [_	11.3				
ANNULAR VOLUME	(ASSU	JME 30% P						l	
V annulus	De	epth Screen Botton	Depth n Bottom of Sea		allons of Water (annulus)			1	
0.64]x [([29.8	5.0]]= [15.9			l	
WATER TO BE REM	OVED			Total Galle	ons to	Actual (Gallons		
Gallons of W. (well)	ater	Gallons of Water (annulus)	Removal <u>Multipler</u>	be Remo		Rem			
[(11. 3	+ [15.9)]x 5 =	134		14	0	1	
MEASUREMENTS					Well	An	nulus *	1	
Well Purging					V well	dia	V annulus		
of Gallons				m 1114	0.10gal/ft	4.0	0.29gal/ft		
Time Removed	рН 6.38		71.0	Turbidity	_	6.5 7.25	0.46gal/ft 0.59gal/ft		
08/45 100	6.63		11.2	7999 7997	- 2" - 0.17gal/ft	7.75	0.69gal/ft		
					_	8.25			
					- 4"		0.64gal/ft 1.06gal/ft		
					0.66gal/ft	12.25	1.63gal/ft		
Post Sampling	6.56	1097	11.3	7999	6" — 1.5gal/ft	12.25	1.41gal/ft		
CAMPI TNC									
SAMPLING	77.	\$740.							
Sample ID Analysis	Volun (ml)		Preservation		Container		Time		
IIMOOBIYM TOTAL METALS	1000		NHAC PHE		HDPE HDPE		945		
I I MOOBIEM DISSOURD METAL FIELD BLANK TOTAL METALS	(000	$-\frac{1}{M}$	NHOIC OH		HUPE		830	•	
ZINSÓ BLANK TOTAL METALS	1000		NHAIL OH C		HOPE	_	1840		
0200 020 1000	(11)								
> 9360-350 (@100750)									
Notes (include data on fi		inkers with me	easuring device.	well conditi	on, etc.)	100 8	WTYGET O	4	
100 GALLONS I	tenove	ED ON Z-	10-13	VII VOIMIN	/11	D F4	ופמן זענ	C481	
40 GALLONS FIELD BLANK AND	le move	DO ON 2-	17-93	ED PUMAN	10 2-17-93				
* Assumes 30% porosity	KINSE	BLANK COUL	ECTED PRIVIL	- 101000					
Signature 9P	Now	t-	Date 2-13	1-93 No	o. of Bottles	4			

Appendix E: Ordnance Demolition Area Field Forms

Appendix E-1: Ordnance Demolition Area Soil Boring Logs and Monitoring Well Installation Logs

WALLE A LO UNITINI W I Client USAEC Soil Boring Log Artlur D Little Project Fort Meade Case No. 67069 . LOCATION Date Start 1/22/93 Contractor ATEC DSafety Drill Method Hollow Skm Auger ate Complete 1/25/93 Type Of Rig MARILE DRILL B-57 Hole Diameter Drilling Additives No NE Casing Size 6" H.S. AUGER Geologist M. Greenwood 9. Naushton Boring Depth 15.01 Sampling Method 2' × 3" SPLIT SPOON GEOLOGIC DESCRIPTION SAMPLE Blows Total Scale Unified Soil Class ID, color (Munsell System), grain size, Type Per **Organics** sorting, moisture, compaction, indication of contaminants in Interval and Recovery 6" (ppm) (unusual odor or sheen), and general stratigraphic description Feet number p-0.3 moderate yellowish brown love 5/4 1.7 Chem. 7 ۵۵ 00--0.0 Sample Swhell sorted sand trace colobies, trace organics, 10 2.0 Topos-1.7' Mottled, primarily dark yellowish orange with bands of light brown 5425/6 - Poorly sorted fine - medium sand, trecesub-angular pebbles, dry, medium dense AE 31550 AM3 16 18 -1.0 900 3501 .2.0 3.0 [8]0-0.4 Darkyellowish brown orange 1041666. 5.0 1.4 chenical 4 5.0-Aborty sorted gan "I fine - medium sand, trace grave" sample 863 1415 8 7.0 [32] 0.4-0.55 light brown syr sle, well sorted fine 12 sand, moist geo smjo.ss-1.4 very pale orange 10 yr Blz, sandy sitt with well surted fine sandyslightly moist, medium demo 14 950z .7.0 B.O 9.0 Swilmothed light brown SYR 5/0 and Dark yellows 10.0 Chemical orange loya 616, well sorted fine sand, trace orth, 10.0-Ø 3 Sample 8 12.0 moist, Loose CEZ 000 ا ماا -10 10 900 **3603** 120

16 HAMMER 140

V

5'

Hammer FALL sput spoon

Artlur D Little

Soil Boring Log Continuation Page

Boring No. ODA MW-1 Client USAEC Project F7. MEAPE 'Case No. 67-069

					`					Case No.	6700	-9
Scale	SAMPLE Type		Blows Per	Total Organics	GEOLOGIC DESCRIPTION Living of Soil Class ID, color (Munsell System), grain size,							
in Feet	and number	Interval	Reco	very	6"	(ppm)	4.		sture, compaction or sheen), and ge	n indication	or contan	ninants i
-/3.0												-
_14.0												-
_150							END	oF	BORING		·	
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	!		<u></u>								Page :	2 of 2

							Boring No. 00A MW-Z			
Λ	rtlur I) Littl	е	S	oil Bo	ring Log	Project FT. MEADE Case No. 69069			
Date	Start 11	25/93		Contra	ctor 4	TEL	IN LOCATION			
	Complet		13	Drill M	lethod Ho	LIOW STEM AUGER	BERMS			
Hole	Diameter	1-1'		Type O	Type Of Rig Marile Drill B-57					
Casi	ng Size 6	" H.S.	AUGER	Drilling	g Additive	S	MW-Z MW-1			
Bori	ng Depth	15.0	1			VAJGHTON	OUTER			
Sami	oling Met	hod 3	" × 2'	SPLITS	5000 / 14	10 16 HAMMER, 30" DADA	BERM +ACCESS EDAR			
J. C. C.	1	SAMPLE		Blows		GEOLOGIC DI	ESCRIPTION			
Scale in	Type and	Interval	Recovery	Per 6"	Total Organics (ppm)	sorting, moisture, compaction	(Munsell System), grain size, on, indication of contaminants			
Feet	number				(ррин)	(unusual odor or sheen), and g	eneral stratigraphic description			
-0.0						LIGHT ROWN SYR S	16 SILTY SAND WITH SOME			
_	CHEM -	0.0-		12		and the market to the first	A MIRLY SERTED ANDIVA			
_1.0	AM	2.0	1.8'	14	0.0	DENSE. 1.U-Z.O BECOMI LOSE SAND, SYD-RAVI	NO PINEY WELLSTE !			
	GEO -	"	. 0	19			4			
T		1		16	Ì	[SP]				
2.0					-		_			
-										
_3.0										
-					İ					
4.0										
[
-5.0	CHEM -			7		LIGHT BEONN SYR	5/6 MEDIUM HALD			
-	38	5.0 -		12		FINE SAND, LOOSE LITTLE OR NO SILT,	, 10000			
-6.0		7.6	1.5	Į.	0.0	[SP]				
-	5502			17						
7.0				' '	<u> </u>					
-					1		4			
_8.0							-			
		1			1		-			
_9.0						·	-			
7.0										
-						-				
	LHEM		[·	4		LIGHT BROWN SYR				
-	18	10.0		11	1	FWESAND, LOOSE, WET	POURLY GIRTER,			
-1/.0	im	-12.0	1.0	15	0.0	0.8-1.0 LIGHT GREY	N7 SALT AND CLAY			
L	6503	10.		19		WITH MUSICATE	E PLASHICITY -			
7.1	5707			<u> </u>	<u> </u>	[SP]				
				ļ	ļ		-			
B,							_			

Artlur D Little

Soil Boring Log Continuation Page

Boring No. ODA MW-L Client US AEC. Project Ft. MEADE Case No. 64069

Ì			1				Case No. 64-069
		SAMPLE					GEOLOGIC DESCRIPTION
Scale	Туре			-	Blows Tota	Total	Unified Soil Class ID, color (Munsell System), grain size,
in	and	Interval	Recov	very	Per 6"	Organics	sorting, moisture, compaction, indication of contaminants
Feet	number				0	(ppm)	(unusual odor or sheen), and general stratigraphic description
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1,70				ì			
-						ļ	1
14.0			1				-
	;			- 1			
-				- 1			
-15.0							
			l				END OF BORING
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Client USAEC Soil Boring Log Arthur D Little Project FT MEADE Case No. 67069 LOCATION لوي ATEL Date Start 1120193 Contractor ODA ans Drill Method HOLLOW STEM AUGER Date Complete 1126193 Type Of Rig MOBILE DRILL B-57 Hole Diameter Drilling Additives NONE Casing Size L" H.S. ANGER Geologist G. NAJGATTON Boring Depth 14.0' Sampling Method 3"x2' SOUT SPOON, 140 16 HAMPHER, 30" DROP GEOLOGIC DESCRIPTION SAMPLE Blows Total Scale Unified Soil Class ID, color (Munsell System), grain size, Type Per **Organics** in sorting, moisture, compaction, indication of contaminants Interval Recovery and 6" (mqq) Feet (unusual odor or sheen), and general stratigraphic description number 0.0-0.2 GRAVISH BROWN SYR 8/2 MEDIUM SAND -0.0CHEM 9 [SM] WITH SLT, ROOTS, LOOSE, PORKY SORTED. 6.0-2.0 1.8' 18 7.7 - 1.0 DARK YELLOWISH ORGANDE 10 YRG/G SILT WITH v.D [SM] BORLY SOLTED MEDIUM SAND, STIFF 1.0 23 1.0-1.8 HUNT BROWN SYRSYG MERIUM AND FINE 4501 [SP] SAND, LOSE, POORLY SIRTED 16 2.0 3.0 LHEM 1 SSP LIGHT BROWN MEDIUM AND FINE SAND BE WITH SOME GRAVELS, ROUNDED, LOUSE, 12 1.8 1.2 MURLY SORTED, MOIST. BM C.F-0.7 14 14 5512 7.0 [SP] SAME AS ABOVE, WET CHEM 4 1.51 10 10.0-12.0 -11.9 0.6 13 GEO 4503 11 12.

Boring No. and nw-3

Λrtlur D Little

Soil Boring Log Continuation Page

Boring No. ODA MW-3
Client USAEC
Project FT MEADE
Case No. 67069

1						Case No. 67069
G .		SAMPLE		Pie	Total	GEOLOGIC DESCRIPTION
Scale in	Type	T		Blow Per		Unified Soil Class ID, color (Munsell System), grain size,
Feet	and	Interval	Recov	ery 6"	(ppm)	sorting, moisture, compaction, indication of contaminants (unusual odor or sheen), and general stratigraphic description
	number				(11)	(unusual odor or sheen), and general stratigraphic description
- 13.0						
-						1
-140						
L	100	J4.0-/60		F		SP] SAME AS ABOVE -
Γ.	004	14.0-160	1.4	1 12	0.7	
-15,0	7,3		١٠,	10	0.1	
H				12	.	. 7
- 16.0						
L						ENDOF BORING
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Artlur D Little

Monitoring Well Design

Boring No. 004 MW-1
Client USAEC
Project FT. MEAD &
Case No. 67069

Date	Start 1/25	93 Date	Complete 1/25/	93 Hole D	iameter 7.7'	Casing Size 6" HS	AUGER	
	ractor A-			Geologist	6. NAUGHTON			
Drill	Method 6	House s	STEM AUGER	Boring Depth 15.6'				
			L 15-57	Grout method SHOVELED				
Datu				Developmen	t Method to BE	DEVELOPED		
Notes	S							
Carla	SAN	APLE	Well Construction	on Diagram				
Scale in	Туре	'Total	Stratigra	phy ———	Constructio	n Specifications		
Feet	and	Organics	Annulu	15]			- 1	
	number	(ppm)	Well					
					,			
				1 1	Elevation Top Of Ca	sing		
	i		Y . Y . Y .	PROTECTIVE				
		ĺ		- CASHU	Elevation Top Of Ris	ser Pipe		
		,			Elevation Ground St	ırface		
				(See Boring				
				log for letall)	(surveyed (elevations)		
-0.0			- K 777 7	Z petan)		n ground surface)	_	
-	5801		1 1	1		d	4	
-1.0	CHEM	ე.0	\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\	1/4	Type of Surface Casi		-	
	GEO			\angle	I.D. Surface Casing _	<i>6</i> "	4	
-20			100 1	•	Type Of Riser Pine	PVC (SCH HO)		
-20			55 17 0	•	I.D. Riser Pipe 4	PVC (SCH. 40)		
•			33			_	7	
-3.0		•		_	Diameter Of Borehol	le/. /	7	
.				•	Type Of Backfill 6	rout	+	
_4.0	į			•			-	
.					Type Of Seal BENT		4	
5.0					Depth To Top Of Sea	1/.5		
			٠,١-١٠	•	Type Of Sand Pack_		J	
, [4502		: [-].	•	Depth To Top Of Sar	nd Pack 3.0'		
-6.0	CHEM	0.0	· H.					
.	34.		1917.		Type Of Screen MAC	HHE SUPTED PUL	7	
-7.0			SAZ		Slot Size D.o/' I.D. Screen 4"		\dashv	
			, M		Screened Interval	10.0'	4	
-8.0			FILTER	.			4	
			# N.	.: 1	Depth To Bottom Of	Well /3.5'		
				.	•		7	
4.0	1	1		•	Depth To Bottom Of I	Borehole /5.6'		
				•	z cp.m. x o Doutom Of I	Joi choic 15	4	
10.0		1	1.14	• 1			ı	

Monitoring Well Design Client US AEL Artlur D Little Project FT. MEADE (Continuation Page) Case No. 67067 **SAMPLE** Well Construction Diagram Scale Total -Stratigraphy -**Notes and Comments** Type in **Organics** -Annulus and Feet Well number (ppm) -10.6 PICKET CONFIGURATION 4503 0.1 -11.0 -7.0 (well) -130 4.0 -14.0 CEMENT WEN -15.0 049 CHOUT MIXTURE 3 BAUS PORTLAND CEMENT TYPE I 15 165 GRANULAR BENTONITÉ 20 GALLONS WATER MECHANICALLY MKED BENTONITE CHIPS LETCO - COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY PURE GOLD MEDIUM CHIPY GLANULAR BENFONTEE LETCO - C/S GRANULAR

Boring No. ODA MW-1

Arthur D Little

Monitoring Well Design

Boring No. ODA MW. Z Client VS AEC Project Pt. MEADE Case No. 67069

Date	Start 1/25	/13 Date	Complete 1/25/	93 Hole Di	iameter /./' Casing Size 6 45. Au Ge
Cont		TEL			6. NAUGHTON
Drill	Method A	YOLLOW ST	em Auger	Boring Dept	th 15.0'
			ILL B-57	Grout metho	od poured
Datu				Developmen	t Method to BE DEVELOPED
Note	S				
Scale in	SAN Type	MPLE Total	Well Construction	on Diagram	Construction Specifications
Feet	and number	Organics (ppm)	-Annulu Well		Construction Specifications
				PROTECTIVE CASINO	Elevation Top Of Casing Elevation Top Of Riser Pipe Elevation Ground Surface
- 0.0	55\$1 CHEM GEO	0.0	G Kou T	(See Boring Log for detail)	(surveyed elevations) (depth from ground surface) Type of Surface Casing STEEL PIPE, NICES I.D. Surface Casing 6"
-2° -3.0			BENTAMITE CAIPSO	0	Type Of Riser Pipe PVC SCH 40 - I.D. Riser Pipe 4" Diameter Of Borehole /// Type Of Backfill 6Rout -
50					Type Of Seal BENTONITE CHIPS Depth To Top Of Seal 1.5'
6.0	55ØZ CHEM	0.0		•	Type Of Sand Pack
7.0	ceo		SAND		Type Of Screen MACHINE SCOTED PVC - Slot Size 0.0/' I.D. Screen 4" Screened Interval /4.2 - 4.0'
8.0			Scee		Depth To Bottom Of Well 14.0
9.0					Depth To Bottom Of Borehole /5.0'

Boring No. DDA MW-Z Monitoring Well Design Client USAEC . **Arthur D Little** Project FT. MEADE (Continuation Page) Case No. 67069 **SAMPLE** Well Construction Diagram Scale -Stratigraphy -**Notes and Comments** Total Type in Annulus **Organics** and Feet Well (ppm) number PICKET CONFIGNEATION 10.0 6503 CHEM 0.0 -11.0 GEO -17.0 (WELL -13.0 -14.0 GROUT 1.5 BAGS PORTLAND CEMENT TYPE I -15.0 7.5 ILS GRANULAR BENTONTE 7.5 GAZLOWS WATER MECHANICALLY MIXED BENTO MTE CHIPS LETCO (COLLOID ENVIRONMENTAL TELHNOLD GRES COMPANY) free word medium enips GRANULAR BENTONITE CETCO - C/S GRANULAR

Artiur D Little

Monitoring Well Design

Boring No. ODA MW-3
Client USAEC
Project FT MEAD'E
Case No. 43049

Drill	Method He Of Rig Mo m	APLE Total Organics	Well Construction Stratigrap	n Diagram	th 16.0' d Povizer t Method To 1	
-0.0 -1.0 -2.0 -3.0 -3.0 -3.0 -3.0	SEO SSOL	о. o	FILTER SAND BENTANTE BENTANTE CROSEE RESER RESER	(See Boring Log for detail)	Elevation Top Of Elevation Groun (survey (depth) Type of Surface Casi Type Of Riser Pi I.D. Riser Pipe Diameter Of Bord Type Of Backfill Type Of Seal Be Depth To Top Of Type Of Sand Pa Depth To Top Of Type Of Screen Policy Slot Size Policy I.D. Screen Policy Screened Interval	pe PVC (SCN 40) GROUT ENTONITE (NIPS Seal 1.5' ck Sand Pack 3.5'

Boring No. ODA MW-3 **Monitoring Well Design** Client USAEC . Arthur D Little Project FT. MEADE (Continuation Page) Case No. 67067 **SAMPLE** Well Construction Diagram Scale -Stratigraphy -Total . Notes and Comments Type in -Annulus 7 **Organics** and Feet Well number (ppm) PICKET CONFIGNRATION -10.0 GEO 5503 - 11-0 0.6 -120 (was - 13.0 CEMENT WELL PAD - 14.0 PICKET veo GROUT MIXTURE 0.7 5504 - 15.0 2 BAUS PORTLAND LEMENT TYPE I 10 166 GRANULAR BENTONITE 15 GALLONS WATER MECHANICALLY MIXED BENTONITE LHIPS CKTCO - COLLOID ENVIRONMENTAL TECHNILOMES CONPANY PURE GOLD MEDIUM CHIPS GRANULIK BENTONITÉ CETCO- US GRANULAR

Appendix E-2: Ordnance Demolition Area Monitoring Well Development Logs

)	Λrthur D Little	Monitoring Well Development Data Sheet	Project =	5 AEC THEADE 67069
	Date Developed: ス//ケ /	75 Developed By:		CATION
	Depth to Water: 5-23		mw-2	
		EL O HNu 1-5		o bam)
	Measuring Point: Joshe	notch on AK Riser	YW-1 ==	
	Notes:		10-7	
	WELL VOLUME (* us V well O-66	Depth Screen Bottom Depth Water	ons of Water (well) . 293	
	ANNULAR VOLUME V annalus 1-06	Depth Screen Bottom Bottom of Seal	lons of Water (annalus) / _ /\$	
	Gallons of Water (well) [(7-293	OVED Gallons of Water Removal Multipler + //-/5)] x 5 = 92.22		tual Gallons Removed /20
	MEASUREMENTS			ABLE
			Well	Annalus *
	Number of Gallons Time Removed 1405 0.0 gallons	pH Conductivity Temperature Turbidity 4.87 060 7-0 999 4.97 .095 7 9 999	V well 2" 0.17gal/ft	dla V annalus 6.5 0.46gal/ft 7.25 0.59gal/ft 7.75 0.69gal/ft 8.25 0.79gal/ft
	1525 60 1880 90	<u>4-9/</u> · 105 <u>8-3</u> <u>999</u> <u>5-16</u> · 108 <u>8-1</u> <u>999</u>	4" 0.66gal/ft	8.25 0.64gal/ft 10.25 1.06gal/ft 12.25 1.63gal/ft
			6" 1.5gal/ft	12.25 1.41gal/ft
	Depth to Sediment: Before			
	Type/Capacity of pump	Hard baker / KBCK PUMP		
	Pumping Rate	Recharge Time		
	Time to Develop Well:	Start <u>/405</u> Finish <u>/605</u> Durati	ion <u>120</u>	mudes
	ston this has all	pump. Pumped 30 gallons till clear	G.	OS'
t		* Assumes 30% porosity for sand pack		

Λrthur D Little	Development Data Sheet	Client US Project Fo Case No.	3 C A 3 M
0 20.1	Developed By: K.Elingwood FRIEDEN Total Depth: 16.74 EL O HNu 1.3 The on Puc Riser	nw-2 (XO Berm
V well	Depth Screen Bottom Depth Water	ons of Water (well)	
ANNULAR VOLUME V annalus LOG WATER TO BE REMO	Depth Screen Bottom Bottom of Seal x [(16.74 - 5.74)] =	lons of Water (annalus)] .
Gallons of Water (well)	Gallons of Water Removal Multipler be Removed March 1 - 66		tual Gallons Removed
Number of Gallons Time Removed 4335 0.0 gallons 1446 30	pH 4. > Conductivity Temperature 7. 3 9.77 4-61 -080 -090 9.5 799 190 4.88 .091 10.0 14	Well V well 2" 0.17gal/ft	Annalus * dia V annalus
Depth to Sediment: Before	u.71 .091 9.7 863* e After	0.66gal/ft 6" 1.5gal/ft	10.25 1.06gal/ft 12.25 1.63gal/ft 12.25 1.41gal/ft
Type/Capacity of pump Pumping Rate ~ 60 6	Reck/ CRWAPUS Recharge Time 10 minutes	70 6.9	is '
	LATE TO TEST WELL RECARGE = 125	the to de	00 Htg.

		ODA ,			
	7.7.11	Well No. MW 03			
Arthur D Little	Monitoring Well	Client USAEL			
With the Fifthe	Development Data Sheet	Project Fi. MEADE			
		Case No. 67669			
Date Developed: 2/12/9		thaite LOCATION. mwoz			
Depth to Water: 6.26					
0 ² 20.7 % L	EL +40 = 37. HNu 1.4 PPM	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\			
Measuring Point: Name	Notch PUC FISHE				
Notes:		1.1			
TATELL MOLUME (* no	e appropriate values in table for each code lette	r)			
		Gallons of Water			
V well (756)	Depth Screen Bottom Depth Water	(well)			
40.66	x [(17.77 - 6.26)]= [7.6			
ANNULAR VOLUME	(ASSUME 30% POROSITY)	C. N. C.W.			
V annalus	Depth Screen Bottom	Gallons of Water (annalus)			
1.06	x [(「17.77' - る.5 7.37)]=	11.02			
WATER TO BE REMO	OVED				
Gallons of Water	Gallons of Water Removal Total Gallons	Actual Gallons			
(well)	$\begin{array}{c} \text{(annulus)} \\ + & 11.02 \end{array})] \times 5 = 93 \end{array}$	Removed 1			
[(+ <u> -02</u>)]x <u> </u> 3 = <u>-13</u>	TABLE			
MEASUREMENTS		Well Annalus *			
		Vwell dia Vannalus			
Number of Gallons		6.5 0.46gal/ft			
Time Removed	pH Conductivity Temperature Turbidity 5-31 - 120 4-6 7999	- Time Start			
1000 0.0 gallons	5.30 0.07 5.3 7999	0.17gal/ft 7.75 0.69gal/ft 8.25 0.79gal/ft			
7032 30	5-2 0.06 8.7 7999				
1047 45	5.2 0.06 6.3 >999	4" 8.25 0.64gaVit			
1102 60	5.3 0.05 4-6 7999	- 0.66gal/ft 10.25 1.63gal/ft 12.25 1.63gal/ft			
1115 75	5.2 0.06 9.4 >990	112 75 11 /11gol/lit 1			
1127 95	5-3 -05 9.7 7999	1.5gal/ft 12.25 1.41gal/ft			
Depth to Sediment: Before	re After				
Type/Capacity of pump Keck SP-87 submersible					
Pumping Rate ~1.25 Sa) Mic Recharge Time 600 d					
Time to Develop Well:		ration 110 min.			
COMMENTS (include	description of water removed) 155 1202	1201 1222			
1 purge mater light orangel brown in rolor prop of 18.6 126 7.38 (1.6)					
e no noticense st.	en lodor of page water taking	temp reaching much swoner			
- Tim & Exic alternat	ed temperatur readings. Erec was taking	Eurollys at Allx			
tolloom than I im	tor mater				
	* Assumes 30% porosity for sand pack				

		Ionitoring Well Sampling		Well No. ODA-MW-1 Client USAEC		
Arthur D Little	1,101					
		Data Sheet		Project F66 M Case No. 640 69		
Pate Sampled: 2/26/92	Sa	mpled By: v	esper w	See		CATION
Depth to Water: 5.96		otal Depth:	16.17	00012		
		· I			/ 84	OPA-L
O_2 20.9 LE	L o.	00 P.	ID 0.00	7	(#
Measuring Point: worth	- 4T 7	p of PVC	HISEK.			
Equipment: TEFLON	BAILER	_				/
WELL VOLUME (* us			table for each c	ode letter)		
V well		Screen Bottom	Depth Water		llons of Water	
		16.17 -	5.96	1)]= [4	(well)	
_ ** ** - ** - * - * - * - * - * - * - *				- / J		
ANNULAR VOLUME			Depth	Ga	llons of Water	
V annulus		Screen Bottom	Bottom of Seal		(annulus)	,
1.06	x [(L	16.17 -	5.5)]=	11-31	
WATER TO BE REMO		lana aCIV-4	Da	Total Gallo	ns to	Actual Gallons
Gallons of Wat		lons of Water (annulus)	Removal <u>Multipier</u>	be Remov		Removed
[(6.74] + [11.31	x 5 =	90.3		190
MEASUREMENTS					Well	Annulus *
Well Purging			•		V well	dia V annulus
Number of Gallons					1.5"	4.0 0.00 1/5
Time Removed	pH	Conductivity	Temperature	Turbidity	0.10gal/ft	4.0 0.29gal/ft 6.5 0.46gal/ft
1030 0	5.06 4.69	0.000	7.3	365	2"	7.25 0.59gal/ft
					- 0.17gal/ft	7.75 0.69gal/ft
						8.25 0.79gal/ft
					- 4"	8.25 0.64gal/ft 10.25 1.06gal/ft
				•	0.66gal/ft	12.25 1.63gal/ft
Post Sampling	4.86	0.121	4.5	274	6" - 1.5gal/ft	12.25 1.41gal/ft
					1.5gavit	<u> </u>
SAMPLING						ł
	Volume	Filtered	n			-
Sample ID Analysis	(ml) 40	(Y/N)	PreservationKU		Container ev VTAL	Time 12:50
OLMOGOLYN VOA	40	N	HCI		nervial	
DIMPOBLYS SVOA	1000	N	100	amb	a jar	
OLMANDIZM FILTER M.	500	<u> </u>	HN03	HOP		
DIMPOULYM METALS	500	- N	HNOS	HOP		
DIMBURILE EXPLUSIVES	1000	N	iœ	_am	ber jar	
Notes (include data on flo	aters/sinke	ers with measu	ıring device, we	ell conditio	n, etc.)	
Assumes 30% porosity			1			

Arthur D Little		g Well Sampli ta Sheet		Client US Project Ft	NEAUE 64069	
Date Sampled: 2 24 9	Sampled By:	WEBBER GOLDTH	UM7E	PH LOC	ATION By Mur. 3	
Depth to Water: 6.6	Total Depth:	16.7.		0	SEPLMS	
O ₂ 20.7 LI		PID o.4				
Measuring Point: NoteH	IN TOP OF PUL	RISER	3+	æ	4	
Equipment: KECKPUMP, TEFLON BAILER MW-2 MW-1						
WELL VOLUME (* use appropriate values in table for each code letter)						
V well	Depth Screen Botton		Ga]= [_	llons of Water (well) 4,7		
ANNULAR VOLUME	(ASSUME 30% P	OROSITY)				
V annulus						
WATER TO BE REMO Gallons of Wa (well) [(& . 7		Removal Multipler S = [Total Gallo be Remov	red	Actual Gallons Removed	
MEASUREMENTS Well Purging Number of Gallons Removed O 1030 Post Sampling	pH Conduction 11/5 11/5 11/5	7.7	Turbidity 211	Well V well 1.5" 0.10gal/ft 2" 0.17gal/ft 4" 0.66gal/ft	Annulus dla V annulus 4.0 0.29gal/ft 6.5 0.46gal/ft 7.25 0.59gal/ft 7.75 0.69gal/ft 8.25 0.79gal/ft 8.25 0.64gal/ft 10.25 1.06gal/ft 12.25 1.41gal/ft	
1650 100	4.56 .116	4.5	7994	- 1.5gal/ft		
SAMPLING	Volume Filtere	d				
Sample ID Analysis	(ml) (Y/N)	Preservation		Container	Time	
Olm.oozyv VDA	2 x40 N	HCI PHLL		AMBER	1645	
OLMOOOZYS BNA	1000 N	HND2 PH22		MISER	1645	
OLMODOZYM METAL	500 Y	HNO PHLZ	_	IDPE	1645	
O IMPOOSAE EXPLOSIVE	1000 N	166		nBEVI	1645	
Notes (include data on floaters/sinkers with measuring device, well condition, etc.) *Assumes 30% porosity						

					TYT II NT		1111 2	7
	Mo	Ionitoring Well Sampling Data Sheet			Well No. opa-MW-3			ł
Arthur D Little	14101				Client USACE Project F66M			┨
Ardu B Little								-
	L				Case No. 6			4
ate Sampled: 2/24/7	3 S	ampled By:	SPERIWE	SEEK	LOC	CATION	4	
Depth to Water: 5.92	Т	otal Depth:	17.45		,00A-	MW-3	SEEM	†
				i	/ 🕏	, –	1	ı
O_2 20.7 LH	EL o.	00 Pl	D 0.0			(1	l
Measuring Point: + ** • 6	PVC PI	AT LO	CK LATCH ON	CASINE	- \	YEN BY	sen /	l
								l
Equipment: KECK PUM								ł
WELL VOLUME (* 115	se appropr	iate values in t	able for each c					ļ
V well	Depth	Screen Bottom	Depth Water	Ga	llons of Water (well)			l
0.66	x [(17.75 -	5.92])]= [7.81			l
ANNIER AD VOI TIME	(A CCTIM	E 20% DOD	OSITV					1
ANNULAR VOLUME	(ASSUM	E 30% TON	Depth	Ga	llons of Water			
V annulus	Depth	Screen Bottom	Bottom of Seal		(annulus)			l
1.06	x [(17.75	6.0	」)]= <u></u>	12.46			
WATER TO BE REMO	VED							
Gallons of Wa		llons of Water	Removal	Total Gallo be Remov		Actual (Remo		١
(well)	一. 厂	(annulus) 12.46)]	Multipler =	101			p /	l
[(7.0/	<u> </u>	12:10	x _ 2 _ =	101				ł
MEASUREMENTS					Well		nulus *	1
Well Purging Number			•		V well	dia	V annulus	1
of Gallons					1.5" 0.10gal/ft	4.0	0.29gal/ft	l
Time Removed	pH	, Conductivity	Temperature	Turbidity	0.10gabit	6.5	0.46gaVft	-
1325 101	4.59	0.059	8.7	436	_ 2"	7.25	0.59gal/ft	
	7.11				0.17gal/ft	7.75	0.69gal/ft	
					-	8.25	0.79gal/ft	
					4"	8.25	0.64gal/ft	
					0.66gal/ft		1.06gal/ft 1.63gal/ft	
Post Sampling			9,	48/	6"		1.41gal/ft	
1400 - 101	4.87	0.056	8.1	101	- 1.5gal/ft			
SAMPLING	V-1	F. 14 3						
Sample ID	Volume (ml)	Filtered (Y/N)	Preservation		Container .		Time	
Sample ID Analysis	Your		401		nber vial		340	
OLM & B & SYV VOA	HOML	<u> </u>	<u>Hel</u>		nber wal			
DIMBOOSYS SVOA	11.	<u> </u>	<u> (ce</u>		nber jar			1
DIMODISTAM FILEMET	500ML	- - Y	HNOZ	HD HD				
OLMBOUSYM METALS	500mL		HND				1	1
OIMOROYE EXPLOSIVES	[Ε,	N	100	<u>am</u>	ber jar		<u> </u>	
								ł
Notes (include data on flo	oaters/sink	ers with measu	ıring device, w	ell condition	on, etc.)			
* Assumes 30% porosity			1					
Signature HMW	lebbur	_	Date 2/26	193 No	o. of Bottles	6		

Appendix F: Soldiers Lake Surface Water Sampling Logs

Arthur D Little

Surface Water/Sediment Sampling Data Sheet

Date -L	13	199	•	
Client 4				
Project CGGM				
Case No. 67069				

	Sampli	ing Data S	heet	Project 6-2	
				Case No. 6	7069
LOCATION Sampling Location Disc		n slsv	v-a		
Type Of Water Body					
Channel Width	Channel Der	oth <u>1.75#</u>	Est. Flow _		
Discharge Points (YA)	Location				
Odors, Surface Sheen					
LOCATION DIAGE		tion sampling loca	otions discharge/r	echarge points	etc.)
LOCATION DIAGE	AVI (Indicate orienta	tion, sampling loca	itions, descriaine.	cenar ge point	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
					skw·2
	1 - V	111 Il	*	_	TAKEN FROM
	CELF C	EUN	Elen Be	1000	END OF DAM.
	LAFF		S. S. S. S. S. S. S. S. S. S. S. S. S. S	AM	
	ALLEN	(ISTE)	A	VET	
			PMO		
SAMPLING PROCE	DURE				
Equipment Used (Calib		BA			
Solvent 1 Used	Solvent	2 Used		. Other	
Decontamination Proceed	ures Used				
DI Water Rin		ter Rinse	Detergent Wa		Other
Solvent 1 Rin Solvent 2 Rin		ter Rinse	DI Water Kin	se [Z	71
Solvent 1 Rin					
DI Water Rin					
GROUND WATER (HARACIERISI	i i C	FREE CL		
TEMP pH	COND	D.O.	Y/N	TURB	TIME
3.70 5.83	0.512			10	1425
SAMPLING		VOLUME	FILTERED		
SAMPLE MA	TRIX METHOD		(Y/N)	PRESERV.	TIME
E1 K4 482YA (1824)	W GRAB			ILE	1430
	~	500	<u> </u>	HUOZ	
	~ -	1000	7	142	
GIKD455YM(ME)	~	500	H	Halos	
aikbassen(het.)	w_	500	<u> </u>		
NOTES TOTAL D	PTH OF WATE	DE COLUMN	AT SAMPL	NG LOC.	· 1.75′
ALSO COLLECTED	SUPLICATE SAME	LE 94QC-1	455 AND F	IELD BLM	NK 94QC-158
Signature 11 4 4 12-10		Data +	1=/44 No. C	of Rottles -	The .
Signature Huwell	<u>u</u>	Date 17	No. C	n Dotties S	1/

Λrthur D Little	Surface Water/Sed Sampling Data S		Date 1/1 Client 1/2 Project F Case No.	9/94 · SAEC GGM 67069
Type Of Water Body	Channel DepthUNK_			Lake
LOCATION DIAGRA	M (Indicate orientation, sampling local	ations, discharge	ive r	,etc.)
SAMPLING PROCEDURE Equipment Used (Calibrated Y/N) Solvent 1 Used Solvent 2 Used Other Decontamination Procedures Used DI Water Rinse Solvent 1 Rinse				
GROUND WATER CH	COND D.O.	FREE CL ⁻ Y/N	TURB	TIME (LOO_
SAMPLING SAMPLE MATE S1K00012A (Pest) W S1K00012M (Met) W S1K0001YM (Met) W	VOLUME (ml) GRAB LOCO SOO SOO	FILTERED (Y/N) N N Y	PRESERV. LE HNOS HNOS	TIME
NOTES Lake wa	s frozen to a dep	th of -	5 inches	below

through the Binches of ice. Sample was collected immediately below the ice - derived from the top 0-6" of the encountered water. Signature Shannon C. Stover Date 1/19/94 No. Of Bottles

Appendix G: Anne Arundel County Drilling Permits

Appendix G: Anne Arundel County Drilling Permits

FGGM Area	USAEC Site ID Code	County Permit #
DSY	MW-200 MW-201	AA-88-9138 AA-88-9139
FTA	FTAMW-1 FTAMW-2 FTAMW-3	AA-88-9132 AA-88-9133 AA-88-9134
ННА	HHAMW-6	AA-88-9147
ODA	ODAMW-1 ODAMW-2 ODAMW-3	AA-88-9135 AA-88-9136 AA-88-9137

C 1 4444 SEQUÊNCE'NO. (DENV USE ONLY)	STATE OF MARYLAND	THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.
1 2 3 (THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)	WELL COMPLETION REPORT FILL IN THIS FORM COMPLETELY PLEASE PRINT OR TYPE	COUNTY NUMBER 02.
Si /CO USE ONLY DATE Received DATE WELL COMPLETE 13 15 20	-	PERMIT NO. FROM "PERMIT TO DRILL WELL" 28 29 30 31 32 33 34 35 36 37
OWNERlast name	first name TOWN	
STREET OR RFD last name SUBDIVISION	SECTIONTOWN	LOT
WELL LOG Not required for driven wells	GROUTING RECORD yes no WELL HAS BEEN GROUTED	C 3
STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH,	(Circle Appropriate Box) TYPE OF GROUTING MATERIAL	PUMPING TEST
THICKNESS AND IF WATER BEARING DESCRIPTION (Use FEET Check if water	CEMENT CM BENTONITE CLAY BC	HOURS PUMPED (nearest hour)
additional sneets if needed) FROM TO bearing	NO. OF BAGS 45 46 23 NO. OF POUNDS 2962	PUMPING RATE (gal. per min. 11 15 15
Topsice D'z'	GALLONS OF WATER 157 DEPTH OF GROUT SEAL (to nearest foot)	METHOD USED TO MEASURE PUMPING RATE WINF
1:1L	from () ft. to (35) ft.	WATER LEVEL (distance from land surface)
102.96 -11 2'	48 TOP 52 54 BOTTOM 58 (enter 0 if from surface)	BEFORE PUMPING
ansin - my	casing CASING RECORD types	WHEN PUMPING
F. 700.500 3 192	insert STEEL CONCRETE	TYPE OF PUMP USED (for test)
ECH178 - S1171 42'	code below PLASTIC OTHER	A air P piston T turbine
5,70mro. 59'	MAIN Nominal diameter Total depth CASING top (main) casing of main casing	C centrifugal R rotary O other (describe below)
6, 26, 40, 41, 50,	TYPE (nearest inch) (nearest foot)	J jet S submersible
500 74 00 Rg	60 61 63 64 66 70	
671	E OTHER CASING (if used) A diameter depth (feet)	figit on
	H inch from to	PUMP INSTALLED
~ •	screen type or open hole insert appropriate appropriate BRASS OPEN BRONZE HOLE	DRILLER WILL INSTALL PUMP YES NO (CIRCLE) (YES or NO) IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE: CAPACITY:
	code below PL OT	GALLONS PER MINUTE (to nearest gallon) 31 35
	PLASTIC OTHER	PUMP HORSE POWER 37 41
	1 2 DEPTH (nearest ft.)	PUMP COLUMN LENGTH (nearest ft.)
	EW LUBETTO	CASING HEIGHT (circle appropriate box
	8 9 11 15 17 21	and enter casing height) LAND SURFACE
		helow (nearest
CIRCLE APPROPRIATE LETTER	S 23 24 26 30 32 36 E 3 3 3 4 5 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	49 50 51 toot)
A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED	N 38 39 41 45 47 51	LOCATION OF WELL ON LOT A SHOW PERMANENT STRUCTURE SUCH AS
E ELECTRIC LOG OBTAINED	SLOT SIZE 1-010 2 3	J. BUILDING, SEPTIC TANKS, AND/OR
P TEST WELL CONVERTED TO PRODUCTION WELL	DIAMETER (NEAREST INCH)	N LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)
I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE	from to 52	N / A Michael
ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRE- SENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.	GRAVEL PACK L Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z	<
ERS IDENT. NO.	F IN BOX 68 56 66 0EP USE ONLY (NOT TO BE FILLED IN BY DRILLER)	
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)	T (E.R.O.S.) W Q	
(MUST MATCH SIGNATURE ON APPLICATION)	70 72	10
SITE SUPERVISOR (sign. of driller or journeyman	TELESCOPE LOG OTHER DATA	111.
responsible for sitework if different from permittee)	CASING INDICATOR	

DRILLER

٠,٠

C 1 4445 SEQUENCE NO. (DENV USE ONLY)	STATE OF MARYLAND WELL COMPLETION REPORT	THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.
1 2 3 (THIS NUMBER IS TO BE PUNCHED IN COLS, 3-6 ON ALL CARDS)	FILL IN THIS FORM COMPLETELY PLEASE PRINT OR TYPE	COUNTY O2
ST/CO USE ONLY DATE WELL COMPLETE DATE Received DATE WELL COMPLETE DE 15 20 20 20 20 20 20 20 20 20 20 20 20 20	Depth of Well 22 2 26 (TO NEAREST FOOT)	PERMIT NO. FROM "PERMIT TO DRILL WELL" 28 29 30 31 32 33 34 35 36 37
OWNER 11 April 1	first name	73 705
STREET OR RFD last name	IOWN	
SUBDIVISIONWELL LOG	SECTION	LOT
Not required for driven wells STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH,	WELL HAS BEEN GROUTED (Circle Appropriate Box) TYPE OF GROUTING MATERIAL	C 3
THICKNESS AND IF WATER BEARING	CEMENT CM BENTONITE CLAY B C	HOURS PUMPED (nearest hour)
DESCRIPTION (Use additional sheets if needed) FROM TO Check if water bearing	NO. OF BAGS NO. OF POUNDS	PUMPING RATE (gal. per min. to nearest gal.)
Cacisii 57 . 0 0' 4'	GALLONS OF WATER DEPTH OF GROUT SEAL (to nearest foot)	METHOD USED TO MEASURE PUMPING RATE
ALLTAC	from 48 TOP 52 54 BOTTOM 58 (enter 0 if from surface)	WATER LEVEL (distance from land surface) BEFORE PUMPING
mary e sury "	casing CASING RECORD	WHEN PUMPING
anita Free	insert appropriate STEEL CONCRETE	TYPE OF PUMP USED (for test)
5, , , , 0	code below PLASTIC OTHER	A air P piston T turbine
700 - 5174 311	MAIN Nominal diameter Total depth	C centrifugal R rotary Other (describe
" cent	CASING top (main) casing of main casing TYPE (nearest inch) (nearest foot)	27 27 below) Submersible 27 27
7-7,010) 36	60 61 63 64 66 70	Ence.
	E OTHER CASING (if used) C diameter depth (feet)	Dillerie
	H inch from to	PUMP INSTALLED
	C A S - Z G	DRILLER WILL INSTALL PUMP YES (NO (CIRCLE) (YES or NO)
	Ż G	IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS
	screen type SCREEN RECORD or open hole	EXCEPT HOME USE TYPE OF PUMP INSTALLED
	insert appropriate STEEL BRASS OPEN	PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE:
	code below BRONZE HOLE	CAPACITY: GALLONS PER MINUTE (1) 31 35
	C 2	(to nearest gallon) PUMP HORSE POWER
	DEPTH (nearest ft.)	PUMP COLUMN LENGTH (nearest ft.)
	EIPV PK I BUIL	CASING HEIGHT (circle appropriate box
	G 8 9 11 15 17 21	above LAND SURFACE
CUROLE APPROPRIATE LETTER	S 23 24 26 30 32 36	below (nearest foot)
CIRCLE APPROPRIATE LETTER A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED	R E 3 3 41 45 47 51	LOCATION OF WELL ON LOT
E ELECTRIC LOG OBTAINED	SLOT SIZE 1 <u>C/C</u> 23	SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR
P TEST WELL CONVERTED TO PRODUCTION	DIAMETER (NEAREST INCH)	THAN TWO DISTANCES
THEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION"	from -7 / to 2 -7	(MEASUREMENTS TO WELL)
AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF	IF WELL DRILLED WAS	- 16 P-15
MY KNOWLEDGE.	FLOWING WELL INSERT F IN BOX 68 68	
ILLERS IDENT. NO. 1977	OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)	Jan A
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)	T (E.R.O.S.) W Q	100 22
Will Tiking MEDer3	70 72	1 35
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)	TELESCOPE LOG OTHER DATA CASING INDICATOR	
The second secon	DRILLEP	

B 1 01548 SEQUENCE NO.	STATE OF		STATE PERMIT NUMBER
1 2 3 (DP USE ONLY) 1 2 3 6 E PUNCHED	APPLICATION FOR PE		A A - 2 A - 9 1 29
IN COLS. 3-6 ON ALL CARDS) Date Received (APA).	рівазе рії	B 3	LOCATION OF WELL
WINES INFORM	IATION	1 2	
a Alemy		AME AR BCOUNTY	
15 Last Name Owner	First Name 34	23 SUBDIVISION	42
FT 660066 6 M	EANE 55	SECTION .	LOT
. FORT MEADE	Md 70 75 5 0 State 72 Zip 76	FUAT ME	48 50 A D E
57 Town 70	O CIGIC 12	52 NEAREST TOWN	71
IAN A VOLEM	77 License No. 80	MILES FROM TOWN (ente	73 76 77 78
Driller's Name	// License No. 80	B 4	AT 32
Firm Name 8918 HERRAMANN OR Columb	bin md 21045	DIRECTION OF WELL FROM TOWN (CIRCLE BOX)	11 NEAR WHAT ROAD 30
Address a Volem	1-11-92	NW 8 NE	ON WHICH SIDE OF ROAD W 2 E
Signature	Date		(CIRCLE APPROPRIATE BOX) WEST STEAST SOUTH
B 2 WELL INFORMATION 1 2 2 2 2 2 2 2 2 2	v	W TOWN E	
APPROX. PUMPING RATE (GAL. FER MIN.)	12	S _W S _E	34 3 5 0 37 DISTANCE FROM ROAD
(GAL. PER DAY)	20	S S 8-9	ENTER FT or MI
USE FOR WATER (CIRCLE APPR	OPRIATE BOX)		NOT TO BE FILLED IN BY DRILLER HEALTH DEPARTMENT APPROVAL
D HOME (SINGLE OR DOUBLE HOUSEH	OLD UNIT ONLY)	14	A2
IRRIGATION)		COUNTY NAME	COUNTY NO.
1 INDUSTRIAL, COMMERCIAL, STATE AND OTHER (REQUIRES APPROPRIATION P	PERMIT)	STATE SIGNATURE DATE ISSUED	INSERT S
PUBLIC OR PRIVATE WATER COMPANY P APPROPRIATION PERMIT AND STATE H	/ (REQUIRES HEALTH DEPARTMENT	0111292	L Kais
APPROVAL) EST, OBSERVATION, MONITORING (M.		NORTH 15600	O SIGNATURE EXP. DATE
APPROPRIATION PERMIT)		GRID 50	55 57 63
APPROXIMATE DEPTH OF WELL	FEET	SHOW MAJOR FEATUR BOX & LOCATE WELL	ES OF
APPROXIMATE BETTI OF WEEK 24	28	WITH AN X SOURCES OF DRILLING	3 WATER X
APPROXIMATE DIAMETER OF WELL	NEAREST INCH	1. Nue	
METHOD OF DRILLING (c	circle one)	2. required	
BORED (or Augered) JETTED	Jetted & <u>DRIVEN</u>	WRITE THE BOX NUME FROM THE MAP HERE	BER
30 AIR-ROTary AIR-PERcussion CABLE REVerse-ROTary	ROTARY (Hydraulic Rotary) <u>DRive-POINT</u>	THOM: THE WAY THERE	
		E 870	
REPLACEMENT OR DEEPENE	ED WELLS	N 456	000
(CIRCLE APPROPRIATE BO		RELATION TO NEARBY	W SHOWING LOCATION OF WELL IN TOWNS AND ROADS AND GIVE
THIS WELL WILL NOT REPLACE AN E		DISTANCE FROM WELL	TO NEAREST ROAD JUNCTION
THIS WELL WILL REPLACE A WELL T		N	
39 S THIS WELL WILL REPLACE A WELL T	THAT WILL BE USED	1	. \\\ \delta^2 \\ \
D THIS WELL WILL DEEPEN AN EXISTIN			0 /
PERMIT NUMBER OF WELL TO BE REPLAC	CED OR DEEPENDED		X 240' > 3
Not to be filled in by driller (OEP	USE ONLY)	<u> </u>	350'
APPROP. PERMIT NUMBER			
WRITE 54	63	Ro	4TE 37
FORCE IN MITTALS PERMIT No. 1 70 71 72	1981-1911 39 73 74 75 76 77 78 79		35
SPECIAL CONDITIONS			m(a) = 201

C1 /4438	SEQUENCE (DENV USE C		STATE OF MARYLAND WELL COMPLETION REPORT FILL IN THIS FORM COMPLETELY	THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.
(THIS NUMBER IS TO BE PUIN COLS. 3-6 ON ALL CARDS			PLEASE PRINT OR TYPE	NUMBER 02 ·
ST/CO USE ONLY DATE Received	DATE WELL CO	MPLETE 1 3 20	Depth of Well 22 / 4 26 (TO NEAREST FOOT)	PERMIT NO. FROM "PERMIT TO DRILL WELL" 28 29 30 31 32 33 34 35 36 37
OWNER	S Apn	7	first page	
STREET OR RFD	ast name	TOM		7. 107.55
WELL LO	OG .		SECTION	LOT
Not required for d STATE THE KIND OF F PENETRATED, THEIR (THICKNESS AND IF W.	ORMATIONS COLOR, DEPTH	l,	WELL HAS BEEN GROUTED (Circle Appropriate Box) TYPE OF GROUTING MATERIAL	PUMPING TEST HOURS PUMPED (nearest hour)
DESCRIPTION (Use additional sheets if needed)	FEET	Check if water	CEMENT C M BENTONITE CLAY B C	PUMPING RATE (gal. per min.
	FROM TO	bearing	NO. OF BAGS NO. OF POUNDS NO. OF POUNDS	to nearest gal.) 11 15
7	S 11.5	/	DEPTH OF GROUT SEAL (to nearest foot) from from from the first to from surface) 48 TOP 52 54 BOTTOM 58 (enter 0 if from surface)	METHOD USED TO MEASURE PUMPING RATE WATER LEVEL (distance from land surface) BEFORE PUMPING
Cran RIK CITY	12.5 150		casing <u>CASING RECORD</u>	17 20
(Den	12,3 15.0		types insert ST CO	WHEN PUMPING 22 25
			appropriate code below PLASTIC OTHER	TYPE OF PUMP USED (for test) A air P piston T turbine
			MAIN Nominal diameter Total depth CASING top (main) casing of main casing TYPE (nearest inch) (nearest foot)	C centrifugal R rotary O other (describe below)
				J jet (S) submersible
			60 61 63 64 66 70 E OTHER CASING (if used)	
			OTHER CASING (if used) C diameter depth (feet) H inch from to	PUMP INSTALLED
			C AS-ZG	DRILLER WILL INSTALL PUMP YES NO (CIRCLE) (YES or NO) IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS
			screen type or open hole insert appropriate code below STEEL BRASS OPEN HOLE PL OT	EXCEPT HOME USE TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE: CAPACITY: GALLONS PER MINUTE
			C 2 PLASTIC OTHER	(to nearest gallon) PUMP HORSE POWER PUMP COLUMN LENGTH
			DEPTH (nearest ft.)	(nearest ft.)
			E 1(1) 4 1 15 17 21 H 2	CASING HEIGHT (circle appropriate box and enter casing height) LAND SURFACE
CIDOLE ADDOCUDE			s 23 24 26 30 32 36	below (nearest foot)
CIRCLE APPROPRIA A WELL WAS ABANDON WHEN THIS WELL WAS	NED AND SEAL	.ED	Ř 3 41 45 47 51	LOCATION OF WELL ON LOT
E ELECTRIC LOG OBTAINE			SLOT SIZE 100 2 3	SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR
P TEST WELL CONVERTE	ED TO PRODUC	CTION	DIAMETER (NEAREST OF SCREEN INCH)	THAN TWO DISTANCES
THEREBY CERTIFY THAT THIS WELL HA ACCORDANCE WITH COMAR 26.04.04	4 "WELL CONSTRI	UCTION"	56 60 from to	(MEASUREMENTS TO WELL)
AND IN CONFORMANCE WITH ALL CO ABOVE CAPTIONED PERMIT, AND THA SENTED HEREIN IS ACCURATE AND CO MY KNOWLEDGE.	AT THE INFORMATION THE E	ON PRE- BEST OF	GRAVEL PACK 3 1/5 IF WELL DRILLED WAS FLOWING WELL INSERT	7
ERS IDENT. NO.	slem		F IN BOX 68 OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)	
DRILLERS SIGNATURE (MUST MATCH SIGNATURE O		٧)	T (E.R.O.S.) W Q	150 (-750)
SITE SUPERVISOR (sign. of dr responsible for sitework if diffe	riller or journey erent from perm	man ittee)	TELESCOPE LOG OTHER DATA CASING INDICATOR	IN NEARLY GIMP.

B D L (DP USE ONLY)	APPLICATION FOR PE	ERMIT TO DRILL WELL	44-22-91123	
1 2 3 4 (THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)		int or type	70 fill in this form completely 79	
Date Received (APA) OILLIZ GIZ OWNER INFORM	IATION	B 3	LOCATION OF WELL	
0 2 (1 3 0 0 0 0 0 0 0 0 0	ATION	A NUE A R	UNDELL	
15 Last Name Owner	First Name 34	23 SUBDIVISION	42	
F T 6 E 0 2 4 E 6 M 36 Street or RFD	EADE	SEÇTION 44 46	LOT 48 50	
FO 2T MEADE 7	md 20755 0 State 72 Zip 76	FORT SE	1029E 6 MEA)ET	
lan A VOLEM	ON 492	MILES FROM TOWN (ente	er 0 if in town) 73 76 77 78	
Driller's Name	77 License No. 80	B 4	AINTIED Pd	
Firm Name HERRMANN DR (CI	lum bin md 210		11 NEAR WHAT ROAD 30 NORTH	
Address Signature Address A Usland	12-31-92 Date	NW 8 NE 8-9	ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX)	r
B 2 WELL INFORMATION	V	W TOWN E	SOUTH	
ÅPPROX. PUMPING RATE (GAL. PER MIN.)		*	34 7 50 37	
AVERAGE DAILY QUANTITY NEEDED (GAL PER DAY)	20	S _W S _E S _E S _E S _B 8-9	DISTANCE FROM ROAD ENTER FT or MI 38 39	
USE FOR WATER (CIRCLE APPRI			NOT TO BE FILLED IN BY DRILLER HEALTH DEPARTMENT APPROVAL	
D HOME (SINGLE OR DOUBLE HOUSEHO		AA	()7	
I IRRIGATION) TI INDUSTRIAL, COMMERCIAL, STATE ANI	D FEDERAL GOV.	STATE	COUNTY NO.	
22 OTHER (REQUIRES APPROPRIATION P PUBLIC OR PRIVATE WATER COMPANY	(REQUIRES	SIGNATURE	1 1)-0	
P APPROPRIATION PERMIT AND STATE H APPROVAL)		NOOTH / -t	O SIGNATURE EXP. DATE	
TEST, OBSERVATION, MONITORING (M. APPROPRIATION PERMIT)	AT REGUINE	GRID 45600	55 57 63	
APPROXIMATE DEPTH OF WELL 30	FEET 28	SHOW MAJOR FEATUR BOX & LOCATE WELL - WITH AN X		
APPROXIMATE DIAMETER OF WELL	NEAREST INCH	SOURCES OF DRILLING	3 WAIER	X
METHOD OF DRILLING (c	ircle one) Jetted & <u>DRIVEN</u>	3. regulate		•
	ROTARY (Hydraulic Rotary)	FROM THE MAP HERE	BEH	
CABLE REVerse-ROTary	<u>DRive-POINT</u>	ESILO		
other		N 456	000	
REPLACEMENT OR DEEPENS (CIRCLE APPROPRIATE BO		DRAW A SKETCH BELC	OW SHOWING LOCATION OF WELL IN TOWNS AND ROADS AND GIVE	
THIS WELL WILL NOT REPLACE AN E		DISTANCE FROM WELL	TO NEAREST ROAD JUNCTION	
THIS WELL WILL REPLACE A WELL T ABANDONED AND SEALED THIS WELL WILL REPLACE A WELL T		N A		
AS A STANDBY		1 1	(3)	
PERMIT NUMBER OF WELL TO BE REPLACE			₹.	
(IF AVAILABLE) 41	52]	Tisties Am	
Not to be filled in by driller (OEP			OMW-1	
APPROP. PERMIT NUMBER G	[A P] 63		1301	_
FORCE WRITE INITIALS PERMIT No. 14 4 - 70 71 72	73 74 75 76 77 78 79	410	NAMED PORD	_
SPECIAL CONDITIONS			FTAMW-1	

(DENTUSE ONLY)	WELL COMPLETION REPORT	45 DAYS AFTER WELL IS COMPLETED.
1 2 3 (THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)	FILL IN THIS FORM COMPLETELY PLEASE PRINT OR TYPE	COUNTY NUMBER 02
ST/CO USE ONLY	Donald of Mell	PERMIT NO.
DATE Received DATE WELL COMPLETE	D Depth of Well 22 / 1/4 26	FROM "PERMIT TO DRILL WELL" A A - ST - 7 1 2 2
13 15 20	(TO NEAREST FOOT)	28 29 30 31 32 33 34 35 36 37
NER last name	Ment first name TOWN	For Mede 20755
STREET OR RFD SUBDIVISION	SECTIONTOWN	LOT
WELL LOG	GROUTING RECORD , no	C 3
Not required for driven wells STATE THE KIND OF FORMATIONS	WELL HAS BEEN GROUTED (Circle Appropriate Box)	1 2
PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING	TYPE OF GROUTING MATERIAL	HOURS PUMPED (nearest hour)
DESCRIPTION (Use FEET Check	CEMENT CM BENTONITE CLAY BC	PUMPING RATE (gal. per min.
additional sheets if needed) FROM TO rearing	NO. OF BAGS NO. OF POUNDS	to nearest gal.) 11 15
Dan Mid 0	DEPTH OF GROUT SEAL (to nearest foot)	METHOD USED TO MEASURE PUMPING RATE
trand 14	from 0 ft. to 1 ft.	WATER LEVEL (distance from land surface)
1 sand	(enter 0 if from surface) casing CASING RECORD	BEFORE PUMPING 17 20
	types insert ST CO	WHEN PUMPING
(leg Black 14 17	(appropriate) STEEL CONCRETE	TYPE OF PUMP USED (for test)
Geg Blacic 14 17	code below PLASTIC OTHER	A air P piston T turbine
	MAIN Nominal diameter Total depth CASING top (main) casing of main casing	C centrifugal R rotary Other (describe below)
	TYPE (nearest inch) (nearest foot)	jet Submersible
	60 61 63 64 66 70	21 - 21
	C OTHER CASING (if used) C diameter depth (feet) H inch from to	PUMP INSTALLED
	c and	DRILLER WILL INSTALL PUMP YES NO
	A S - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -	(CIRCLE) (YES or NO) IF DRILLER INSTALLS PUMP, THIS SECTION
	screen type SCREEN RECORD	MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE
	or open hole ST BR HO	TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O)
	insert STEEL BRASS OPEN BRONZE HOLE	IN BOX - SEE ABOVE: 29 CAPACITY:
	below PL OT	GALLONS PER MINUTE
	PLASTIC OTHER	(to nearest gallon) PUMP HORSE POWER 37 41
	C 2	PUMP COLUMN LENGTH (nearest ft.)
	E 1 D C 4 DEPTH (nearest ft.)	CASING HEIGHT (circle appropriate box
	C 8 9 11 15 17 21	and enter casing height)
	H 2 2 23 24 26 30 32 36	LAND SURFACE (nearest foot)
CIRCLE APPROPRIATE LETTER A WELL WAS ABANDONED AND SEALED	E 3	LOCATION OF WELL ON LOT
WHEN THIS WELL WAS COMPLETED E ELECTRIC LOG OBTAINED	38 39 41 45 47 51 SLOT SIZE Q/O 2 3	A SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR
P TEST WELL CONVERTED TO PRODUCTION WELL	DIAMETER (NEAREST INCH)	N LANDMARKS AND INDICATE NOT LESS / THAN TWO DISTANCES /
THEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN	from to	(MEASUREMENTS TO WELL)
ACCORDANCE WITH COMAR 26,04,04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRE-	GRAVEL PACK	
SENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE	IF WELL DRILLED WAS FLOWING WELL INSERT	/<
DRILLERS IDENT. NO. 1/92	F IN BOX 68 68 OEP USE ONLY	250
DRILLERS SIGNATURE	(NOT TO BE FILLED IN BY DRILLER)	K BO TO
(MUST MATCH SIGNATURE ON APPLICATION)	T (E.R.O.S.) W Q	10
	70 72 0TUSE DATA	
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)	TELESCOPE LOG OTHER DATA CASING INDICATOR	" UN named Dd
	DRILLER	ETAMINA

в 101641	SEQUENCE NO. (DP USE ONLY)		MARYLAND	
1 2 3 (THIS NUMBER IS TO IN COLS. 3-6 ON ALI	D BE PUNCHED		ERMIT TO DRILL WELL int or type	70 fill in this form completely 79
Date Received (APA	A)(2)		B 3	LOCATION OF WELL
	OWINER INFORM	IATION	ANNE AR	4000
US AD	7 4	24	8 COUNTY	21
15 Last Name	Owner 0 24 5 6 M	First Name 34	23 SUBDIVISION	42
36	Street or RFD	md 20755	SECTION 44 46	LOT 48 50
FOAT 17		0 State 72 Zip 76	FORT 6E	ORGE 6 MEADE
1. 0	DRILLER INFORMATION	ON WATE	MILES FROM TOWN (ente	er 0 if in town) 73 76 77 78
Driller's Name	VOLEN	77 License No. 80	B 4	
ATEC Firm Name) (I	1: 100	DIRECTION OF WELL FROM	11 NEAR WHAT ROAD 30
Address		16A Md 21045	TOWN (CIRCLE BOX)	NO FIEH
Dan GU	Volem	1-11-92 Date	NW 8-9	ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX)
Signature B 2	WELL INFORMATION		W (TOWN) E	SOUTH
1 3	RATE (GAL. PER MIN.)			34 7 5 0 37
AVERAGE DAILY QU	ANTITY NEEDED	12	S _W S _E 8-9	DISTANCE FROM ROAD
(GAL. PER DAY)	14	20	8-9 S 8-9	ENTER FT or MI F 7 38 39
	R WATER (CIRCLE APPR			NOT TO BE FILLED IN BY DRILLER HEALTH DEPARTMENT APPROVAL
FARMING (LI	LE OR DOUBLE HOUSEH VESTOCK WATERING & A		AA	02
IRRIGATION)	COMMERCIAL, STATE AN		COUNTY NAME STATE	COUNTY NO.
OTHER (REC	QUIRES APPROPRIATION P	ERMIT)	SIGNATURE	INSERT S
P APPROPRIAT	PRIVATE WATER COMPANY TON PERMIT AND STATE H	HEALTH DEPARTMENT	OILLIB	O SIGNATURE EXP. DATE
	RVATION, MONITORING (M	AY REQUIRE	NORTH 45 00	0 EAST 0866000
APPROPRIAT	ION PERMIT)		50 SHOW MAJOR FEATUR	55 57 63 ES OF
APPROXIMATE DEP	TH OF WELL 30	FEET	BOX & LOCATE WELL - WITH AN X	-
	24	28 NEAREST	SOURCES OF DRILLING	S WATER
APPROXIMATE DIAM	ETER OF WELL	INCH	1. NONE 2. REGUIDED	
	THOD OF DRILLING		3.	,
BORED (or Augere	ed) <u>JETTED</u> AIR-PERcussion	Jetted & <u>DRIVEN</u> ROTARY (Hydraulic Rotary)	WRITE THE BOX NUME FROM THE MAP HERE	BER
37 CABLE	REVerse-ROTary	DRive-POINT	†	
other			E 866	
REPLA	CEMENT OR DEEPEN	ED WELLS	N 456	000
	(CIRCLE APPROPRIATE BO	OX)	RELATION TO NEARBY	W SHOWING LOCATION OF WELL IN TOWNS AND ROADS AND GIVE
THE WELL	WILL NOT REPLACE AN E WILL REPLACE A WELL T		N DISTANCE FROM WELL	TO NEAREST ROAD JUNCTION
ABANDONE	O AND SEALED WILL REPLACE A WELL 1			8
AS A STAND			I	
	OF WELL TO BE REPLACE			WW 2
(IF AVAILABLE)	41	52		1
Not to	be filled in by driller (OEP	USE ONLY)]	
APPROP. PERMIT N		A P		150'
	LS PERMIT No. A A-	<u> </u>	://	UNIAMED Pd
67 68 IN BO	70 /1 /2	73 74 75 76 77 78 79		
SPECIAL CONDITION	NO			E-Amui - 2

- Chit

C 1 4440 SEQUENCE NO. (DENV USE ONLY)	STATE OF MARYLAND	THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.
1 2 3 (T: IIS NUMBER IS TO BE PUNCHED N COLS. 3-6 ON ALL CARDS)	WELL COMPLETION REPORT FILL IN THIS FORM COMPLETELY PLEASE PRINT OR TYPE	COUNTY NUMBER 02
ST/CO USE ONLY DATE WELL COMPLETE DI 2 0 9 B	Depth of Well 22 / / 26 (TO NEAREST FOOT)	PERMIT NO. FROM "PERMIT TO DRILL WELL" 28 29 30 31 32 33 34 35 36 37
OWNER US Flomy		
STREET OR RFD last name Fort Get	mach Months first name TOWN_	md 20755
SUBDIVISION	SECTION	LOT
WELL LOG Not required for driven wells	WELL HAS BEEN GROUTED (Circle Appropriate Box)	
STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH,	(Circle Appropriate Box) TYPE OF GROUTING MATERIAL	PUMPING TEST
THICKNESS AND IF WATER BEARING DESCRIPTION (Use FEET Check	CEMENT CM BENTONITE CLAY BC	HOURS PUMPED (nearest hour)
DESCRIPTION (Use FEET Check if water bearing	NO. OF BAGS NO. OF POUNDS	PUMPING RATE (gal. per min. D 11 15
TAN MOIST O	GALLONS OF WATER DEPTH OF GROUT SEAL (to nearest foot)	METHOD USED TO MEASURE PUMPING RATE
mod smd	from 52 ft. to 24 BOTTOM 58	WATER LEVEL (distance from land surface)
Due in a si =	48 TOP 52 54 BOTTOM 58 (enter 0 if from surface) Casing CASING RECORD	BEFORE PUMPING 17 20
70 c'An 14 5	types insert ST CO	WHEN PUMPING 22 25
	appropriate code PL OT	TYPE OF PUMP USED (for test) A air P piston T turbine
	below PLASTIC OTHER	27 27 27 other
	MAIN Nominal diameter Total depth CASING top (main) casing of main casing	Centrifugal R rotary O (describe below)
	TYPE (nearest inch) (nearest foot)	jet Submersible
	60 61 63 64 66 70	21 —21
	OTHER CASING (if used) C diameter depth (feet) H inch from to	PUMP INSTALLED
	C S S S S S S S S S S S S S S S S S S S	DRILLER WILL INSTALL PUMP YES NO
	9-zc	(CIRCLE) (YES or NO) IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS
	screen type SCREEN RECORD	EXCEPT HOME USE TYPE OF PUMP INSTALLED
	or open hole ST BR HO insert STEEL BRASS OPEN	PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE:
	code BRONZE HOLE	CAPACITY: GALLONS PER MINUTE
	PLASTIC OTHER	(to nearest gallon) PUMP HORSE POWER
		PUMP COLUMN LENGTH 37 41
	DEPTH (nearest ft.)	(nearest ft.) CASING HEIGHT (circle appropriate box
	A 8 9 11 15 17 21	and enter casing height) LAND SURFACE
	H 2 2 3 24 26 30 32 36	below (nearest foot)
CIRCLE APPROPRIATE LETTER A A WELL WAS ABANDONED AND SEALED	C 23 24 26 30 32 36 E 3 30 41 45 47 45	LOCATION OF WELL ON LOT
WHEN THIS WELL WAS COMPLETED	N 30 39 41 45 47 51	SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR
E ELECTRIC LOG OBTAINED TEST WELL CONVERTED TO PRODUCTION	SLOT SIZE O 2 3 (NEAREST	LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES
P WELL IHEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN	OF SCREEN (F) INCH) (From to (F)	(MEASUREMENTS TO WELL)
ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRE-	GRAVEL PACK 3 15	/4
SENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.	IF WELL DRILLED WAS FLOWING WELL INSERT	
LERS IDENT. NO.	F IN BOX 68 68 0EP USE ONLY	
DRILLERS SIGNATURE	(NOT TO BE FILLED IN BY DRILLER) T (E.R.O.S.) W Q	250
(MUST MATCH SIGNATURE ON APPLICATION)	74 75 76	
SITE SUPERVISOR (sign, of driller or journeyman	TELESCOPE LOG OTHER DATA	The momen Ad
responsible for sitework if different from permittee)	CASING INDICATOR DRILLER	72 11 12

B 1 01632 SEQUENCE NO	STATE OF	MAADVI AND	STATE PERMIT NUMBER
B 1 01532 SEQUENCE NO (DP USE ONLY		MARYLAND ERMIT TO DRILL WELL	MM-RR-91134
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)		rint or type	70 fill in this form completely 79
Date Received (APA)		B 3	LOCATION OF WELL
MITTALE (O'DWNER	INFORMATION	1 2	
8 13		ANNE AR	4MDE4 1
15 Last Name Owner	First Name 34		
FT 6E029E 6		23 SUBDIVISION	42
36 Street or I	SFD 55	SEÇTION 44 46	LOT 48 50
FURT MEANE	70 State 72 Zip 76	FORT GE	DREE & MEADE
. DRILLER INFO	PRMATION	52 NEAREST TOWN	A TIME
IAN A VOIEN	492	MILES FROM TOWN (ente	r 0 if in town) 73 76 77 78
Driller's Name	77 License No. 80	B 4	AIREIERD Pd
Firm Name	(d. 1: - md 2005	DIRECTION OF WELL FROM TOWN (CIRCLE BOX)	11 NEAR WHAT ROAD 30
Address (1)	Idumbia Md 21045	_ N _	NORTH
Signature a Odlem	73-31-72 Date	N _W 8 N _E 8-9	ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX)
B 2 WELL INFOR	MATION		SOUTH
APPROX. PUMPING RATE (GAL. PER M	AIN.)	(TOWN) E	~[V[2]C] 27
AVERAGE DAILY QUANTITY NEEDED	8 12	S _W S _E	34 X 3 S 37 DISTANCE FROM ROAD
(GAL. PER DAY)	14 20	8-9 S 8-9	ENTER FT or MI
USE FOR WATER (CIRC	LE APPROPRIATE BOX)	8	NOT TO BE FILLED IN BY DRILLER
D HOME (SINGLE OR DOUBLE F	OUSEHOLD UNIT ONLY)		HEALTH DEPARTMENT APPROVAL
F FARMING (LIVESTOCK WATER	NG & AGRICULTURAL	AA	O2_ county no.
L'IRRIGATION) [] INDUSTRIAL, COMMERCIAL, S'	TATE AND FEDERAL GOV.	COUNTY NAME STATE	
22 OTHER (REQUIRES APPROPR — PUBLIC OR PRIVATE WATER C		SIGNATURE	INSERT S 41
P APPROPRIATION PERMIT AND APPROVAL)		011272	O SIGNATURE EXP. DATE
TEST, OBSERVATION, MONITO	RING (MAY REQUIRE	NORTH (C)	O SIGNATURE EXP. DATE O GRID GOOD O
(APPROPRIATION PERMIT)		50 SO	55 57 63
APPROXIMATE DEPTH OF WELL	O FEET	SHOW MAJOR FEATURE BOX & LOCATE WELL _	S OF
APPROXIMATE DEFITION WEEK 24	28	WITH AN X SOURCES OF DRILLING	WATER
APPROXIMATE DIAMETER OF WELL _	NEAREST INCH	1. Nove - 1	
METHOD OF DRILL	ING (airele ann)	2. roquered	
	TED Jetted & DRIVEN	3. WRITE THE BOX NUMBE	
30 AIR-ROTary AIR-PERcussion	ROTARY (Hydraulic Rotary)	FROM THE MAP HERE	
CABLE REVerse-ROT	ary <u>DR</u> ive- <u>POINT</u>	- 001	
other		E 866	
REPLACEMENT OR D	FEPENED WELLS	N 456	000
(CIRCLE APPROPI			N SHOWING LOCATION OF WELL IN TOWNS AND ROADS AND GIVE
N THIS WELL WILL NOT REPLACE	E AN EXISTING WELL		TO NEAREST ROAD JUNCTION
THIS WELL WILL REPLACE A ABANDONED AND SEALED	WELL THAT WILL BE	N	
39 S THIS WELL WILL REPLACE A	WELL THAT WILL BE USED	A	
AS A STANDBY This well will deepen an	EXISTING WELL		1111 3 RV
PERMIT NUMBER OF WELL TO BE	REPLACED OR DEEPENDED		D. x25'
(IF AVAILABLE) 41	52		ñ ← 825 − 17
Not to be filled in by drille	r (OEP USE ONLY)		x 25
APPROP. PERMIT NUMBER	GAP	1.	50'
WRITE	63		
FORCE NINITIALS PERMIT No	71 72 73 74 75 76 77 78 79	9N'- N	(2m15) 12d
SPECIAL CONDITIONS		the state of the s	
			FTAMW-3

1 2 3 44 2 3 (DENV USE ONLY)	WELL COMPLETION REPORT	45 DAYS AFTER WELL IS COMPLETED.
(THIS NUMBER IS TO BE PUNCHED	FILL IN THIS FORM COMPLETELY PLEASE PRINT OR TYPE	COUNTY NUMBER 02
IN COLS. 3-6 ON ALL CARDS) ST/CO USE ONLY	PLEASE FRINT ON TIPE	PERMIT NO.
DATE Received DATE WELL COMPLET		FROM "PERMIT TO DRILL WELL"
8 13 15 20	22 / 3 26 (TO NEAREST FOOT)	A A - R R - P 1 4 7 28 29 30 31 32 33 34 35 36 37
WNER // C Arem	(10 112) (1201 / 001)	20 29 30 31 32 33 34 33 30 37
STREET OR RFDlast name	first name TOWN	TOTE MANE
SUBDIVISION	SECTION	LOT
WELL LOG	GROUTING RECORD yes no	C 3
Not required for driven wells STATE THE KIND OF FORMATIONS	WELL HAS BEEN GROUTED (Circle Appropriate Box)	1 2
PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING	TYPE OF GROUTING MATERIAL 44 44	PUMPING TEST
DESCRIPTION (Use FEET Check	CEMENT CM BENTONITE CLAY BC	HOURS PUMPED (nearest hour)
additional sheets if needed) FROM TO bearing	NO. OF BAGS NØ.20F POUNDS	PUMPING RATE (gal. per min. to nearest gal.)
	GALLONS OF WATER DEPTH OF GROUT SEAL (to nearest foot)	METHOD USED TO MONE
56 BASP 4" 17"	from tt. to tt.	MEASURE PUMPING RATE L. WATER LEVEL (distance #om land surface)
PACSH STINE	48 TOP 52 54 BOTTOM 58 (enter 0 if from surface)	BEFORE PUMPING
131. cc ~ - 51174	casing CASING RECORD	17, 20
51. FEW - 51134 F. TOC. 5410	types insert ST CO	WHEN PUMPING
Eroc. 6-40K 17	(appropriate STEEL CONCRETE	TYPE OF PUMP USED (for test)
-	code below PE OT	A air P piston T turbine
	PLASTIC OTHER	27 27 27 other
	MAIN Nominal diameter Total depth CASING top (main) casing of main casing	C centrifugal R rotary (describe
	TYPE (nearest inch) (nearest foot)	l <u> </u>
		J jet S submersible
	60 61 63 64 66 70 E OTHER CASING (if used)	6 miler
	c diameter depth (feet)	PUMP INSTALLED
	C S	DRILLER WILL INSTALL PUMP YES WO (CIRCLE) (YES or NO)
	N G	IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS
	screen type SCREEN RECORD	EXCEPT HOME USE TYPE OF PUMP INSTALLED
	or open hole ST BR HO	PLACE (A,C,J,P,R,S,T,O)
	(appropriate) STEEL BRASS OPEN	IN BOX - SEE ABOVE: 29 CAPACITY:
	code below PU OT	GALLONS PER MINUTE
	PLASTIC OTHER	(to nearest gallon)
		PUMP COLUMN LENGTH
	DEPTH (nearest ft.)	(nearest ft.)
	E 1 1 1 15 17 21	CASING HEIGHT (circle appropriate box and enter casing height)
	A B 9 11 15 17 21	49 LAND SURFACE
	s 23 24 26 30 32 36	below (nearest foot)
CIRCLE APPROPRIATE LETTER A WELL WAS ABANDONED AND SEALED	R E 3 38 39 41 45 47 51	49 50 51
A WHEN THIS WELL WAS COMPLETED	N 38 39 41 45 47 51	LOCATION OF WELL ON LOT SHOW PERMANENT STRUCTURE SUCH AS
E ELECTRIC LOG OBTAINED	SLOT SIZE 1 2 3 3	J. BUILDING, SEPTIC TANKS, AND/OR
P TEST WELL CONVERTED TO PRODUCTION WELL	DIAMETER (NEAREST INCH)	N LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES
THEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN	56 60 WOLL)	(MEASUREMENTS TO WELL)
ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" ADD IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRE-	GRAVEL PACK	05
SENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.	IF WELL DRILLED WAS FLOWING WELL INSERT	\$40
DRILLERS IDENT, NO. L. 1972	F IN BOX 68 68	merch)
D. C. L. L. C.	OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)	
URILLERS SIGNATURE	T (E.R.O.S.) W Q	AN AIR STO
(MUSJ MATCH SIGNATURE ON APPLICATION)	74 75 76	140 m m 12 m
STE SUPERISON (STEER SUPERISON STEER SUPERISON (STEER SUPERISON (STEER SUPERISON (STEER SUPERISON SUPERISON (STEER SUPERISON SUPERISON (STEER SUPERISON SUPERISON SUPERISON (STEER SUPERISON SUPERIS	70 72 OTHER DATA	* · · ·
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)	TELESCOPE LOG OTHER DATA CASING INDICATOR	
	DRILLER	414 111-

AHA-MUL- MIX # 17

Doil I ED

SPECIAL CONDITIONS

DESCRIPTION (Use additional sheets if needed) FROM TO bearing NO. OF BAGS NO. OF POUNDS 245 46 PUMP to near GALLONS OF WATER A STATE OF THE POUNDS 245 46 PUMP TO PUMP TO POUNDS 245 46 PUMP TO PU	LOT
STREET OR RFD last name / first name TOWN SUBDIVISION SECTION WELL LOG Not required for driven wells STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING DESCRIPTION (Use additional sheets if needed) FROM TO bearing MELL LOG WELL LOG WELL HAS BEEN GROUTED (Circle Appropriate Box) TYPE OF GROUTING MATERIAL CEMENT C M BENTONITE CLAY B C HOUF NO. OF BAGS NO. OF POUNDS 245 45 46 NO. OF BAGS GALLONS OF WATER A METAL NO. OF BAGS GALLONS OF WATER A METAL METAL CONN TOWN	PUMPING TEST RS PUMPED (nearest hour)
SUBDIVISION WELL LOG Not required for driven wells STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING DESCRIPTION (Use additional sheets if needed) DESCRIPTION (Use GROUTING RECORD WELL HAS BEEN GROUTED (Circle Appropriate Box) TYPE OF GROUTING MATERIAL CEMENT CIMI BENTONITE CLAY BC PUMF NO. OF BAGS GALLONS OF WATER METAL CEMENT GALLONS OF WATER NO. OF POUNDS AMERICAN METAL NO. OF POUNDS AMERICAN NO. OF POUNDS AMERICAN NO. OF BAGS GALLONS OF WATER METAL RECORD Yes NO 1 2 44 NO. OF BAGS AMERICAN NO. OF POUNDS AMERICAN METAL AMERICAN NO. OF BAGS GALLONS OF WATER METAL NO. OF POUNDS AMERICAN NO. OF POUNDS NO. OF POUNDS METAL NO. OF POUNDS AMERICAN NO. OF POUNDS NO. OF POUN	PUMPING TEST RS PUMPED (nearest hour)
WELL LOG Not required for driven wells STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING DESCRIPTION (Use additional sheets if needed) FROM TO bearing WELL HAS BEEN GROUTED (Circle Appropriate Box) TYPE OF GROUTING MATERIAL CEMENT C M BENTONITE CLAY B C HOUF WELL HAS BEEN GROUTED (Circle Appropriate Box) TYPE OF GROUTING MATERIAL CEMENT C M BENTONITE CLAY B C HOUF WELL HAS BEEN GROUTED (Circle Appropriate Box) TYPE OF GROUTING MATERIAL CEMENT C M BENTONITE CLAY B C HOUF WELL HAS BEEN GROUTED (Circle Appropriate Box) TYPE OF GROUTING MATERIAL CEMENT C M BENTONITE CLAY B C HOUF WELL HAS BEEN GROUTED (Circle Appropriate Box) TYPE OF GROUTING MATERIAL CEMENT C M GROUTED WELL HAS BEEN GROUTED (Circle Appropriate Box) TYPE OF GROUTING MATERIAL CEMENT C M GROUTED WELL HAS BEEN GROUTED (Circle Appropriate Box) TYPE OF GROUTING MATERIAL CEMENT C M GROUTED WELL HAS BEEN GROUTED (Circle Appropriate Box) TYPE OF GROUTING MATERIAL CEMENT C M GROUTED WELL HAS BEEN GROUTED (Circle Appropriate Box) TYPE OF GROUTING MATERIAL CEMENT C M GROUTED WELL HAS BEEN GROUTED (Circle Appropriate Box) TYPE OF GROUTING MATERIAL CEMENT C M GROUTED WELL HAS BEEN GROUTED (Circle Appropriate Box) TYPE OF GROUTING MATERIAL CEMENT C M GROUTED WELL HAS BEEN GROUTED (Circle Appropriate Box) TYPE OF GROUTING MATERIAL CEMENT C M GROUTED WELL HAS BEEN GROUTED (Circle Appropriate Box) TYPE OF GROUTING MATERIAL CEMENT C M GROUTED WELL HAS BEEN GROUTED (Circle Appropriate Box) TYPE OF GROUTING MATERIAL CEMENT C M GROUTED WELL HAS BEEN GROUTED (CIRCLE APPROPRIATE BOX) TYPE OF GROUTING MATERIAL CEMENT C M GROUTED WELL HAS BEEN GROUTED (CIRCLE APPROPRIATE BOX) TYPE OF GROUTING MATERIAL CEMENT C M GROUTED WELL HAS BEEN GROUTED (CIRCLE APPROPRIATE BOX) TYPE OF GROUTING MATERIAL TYPE OF GROUTING MATERIAL TYPE OF GROUTING MATERIAL TYPE OF GROUTING MATERIAL TYPE OF GROUTING MATERIAL TYPE OF GROUTING MATERIAL TYPE OF GROUTING MATERIAL TYPE OF GROUTI	PUMPING TEST RS PUMPED (nearest hour)
DEPTH OF GROUT SEAL (to nearest foot) from the fit of	arest gal.) HOD USED TO SURE PUMPING RATE ER LEVEL (distance from land surface) ORE PUMPING N PUMPING E OF PUMP USED (for test) ir P piston T turbine entrifugal R rotary Other (describe below)
C 2 DEPTH (nearest ft.) C 2 DEPTH (nearest ft.) C 3 DRILLE (CIRCL IF DRII) MUST EXCEEN RECORD Or open hole insert appropriate code below C 2 DEPTH (nearest ft.) DEPTH (nearest ft.) C 2 DEPTH (nearest ft.) C 2 DEPTH (nearest ft.) C 2 DEPTH (nearest ft.) C 2 DEPTH (nearest ft.) C 2 DEPTH (nearest ft.) C 2 DEPTH (nearest ft.) C 2 DEPTH (nearest ft.) C 3 DEPTH (nearest ft.) C 4 DEPTH (nearest ft.) C 2 DEPTH (nearest ft.) C 2 DEPTH (nearest ft.) C 2 DEPTH (nearest ft.) C 2 DEPTH (nearest ft.) C 3 DEPTH (nearest ft.) C 4 DEPTH (nearest ft.) C 2 DEPTH (nearest ft.) C 3 DEPTH (nearest ft.) C 4 DEPTH (nearest ft.) C 4 DEPTH (nearest ft.) C 4 DEPTH (nearest ft.)	DNS PER MINUTE arest gallon) HORSE POWER COLUMN LENGTH st ft.) G HEIGHT (circle appropriate box and enter casing height) LAND SURFACE elow (nearest foot)
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED E ELECTRIC LOG OBTAINED TEST WELL CONVERTED TO PRODUCTION DIAMETER OF SCREEN (NEAREST INC.)	LOCATION OF WELL ON LOT OW PERMANENT STRUCTURE SUCH AS ILDING, SEPTIC TANKS, AND/OR NDMARKS AND INDICATE NOT LESS AN TWO DISTANCES EASUREMENTS TO WELL)

B 1 01650 SEQUENCE NO.	STATE OF I	MARYI AND	STATE PERMIT NUMBER
B 1 01650 SEQUENCE NO. (DP USE ONLY)	APPLICATION FOR PE		THE CONTRACTOR OF THE CONTRACT
1 2 3 (THIS NUMBER IS TO BE PUNCHED		nt or type	70 fill in this form completely 79
IN COLS. 3-6 ON ALL CARDS)	please pri		
Date Received (APA)		B 3	LOCATION OF WELL
ON VET I'M OF I'M	ATION	ANNE AR	CANELL
8 13	IFE SUC	8 COUNTY	21
15 Last Name Owner	First Name 34		
DATUXENT WILD.	LIFEC+R	23 SUBDIVISION	42
36 Street or RFD	55	SECTION 497 E	LOT
4 A 4 R E C Town 70	1 State 72 Zio 76	D 3 4 2 2	
0, 10,111		52 NEAREST TOWN	71
IAN A VOLEM	497	MILES FROM TOWN (enter	r 0 if in town) 0 M 1 M 1 73 76 77 78
Driller's Name	77 License No. 80	B 4	
ATEC		1 2	LEMONS BAINGE Rd
Sign HERRIMANN IN Column	biA Md 21045	DIRECTION OF WELL FROM TOWN (CIRCLE BOX)	II NEAR WHAI ROAD
Address O	4.7	N	NORTH N
Jan 4 Volem	1-11-92 Date		ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX)
Signature B 2 WELL INFORMATION		8-9	WEST STEAST
1 2		W TOWN E	
ÄPPROX. PUMPING RATE (GAL. PER MIN.)	12		34 20 D 37
AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY)		S W 8-9 S 8-9	DISTANCE FROM ROAD
(GAL. PER DAT)	20	8-9 S 8-9	ENTER FT or MI 7 38 39
USE FOR WATER (CIRCLE APPRO	PRIATE BOX)		NOT TO BE FILLED IN BY DRILLER
D HOME (SINGLE OR DOUBLE HOUSEHO	OLD UNIT ONLY)	4 4	HEALTH DEPARTMENT APPROVAL
F FARMING (LIVESTOCK WATERING & AG	RICULTURAL	AA	02
L'I IRRIGATION)	FEDERAL GOV	COUNTY NAME	COUNTY NO.
OTHER (REQUIRES APPROPRIATION PE	RMIT)	STATE SIGNATURE	INSERT S
PUBLIC OR PRIVATE WATER COMPANY P APPROPRIATION PERMIT AND STATE HE	(REQUIRES	DATE ISSUED	1 Rose
P APPROPRIATION PERMIT AND STATE HE APPROVAL)	EALTH DEPARTMENT	43 48 CC	O SIGNATURE EXP. DATE
TTEST, OBSERVATION, MONITORING (MA	Y REQUIRE	NORTH 44000	0 EAST () 3 ((5) 0 0 0
APPROPRIATION PERMIT)		50	55 57 63
ADDROVIMATE DEDTIL OF WELL 30	FEET	SHOW MAJOR FEATURE BOX & LOCATE WELL _	
APPROXIMATE DEPTH OF WELL 34	28	WITH AN X	WATER
4	NEAREST	SOURCES OF DRILLING	WAIER
APPROXIMATE DIAMETER OF WELL	INCH	2. 0	
METHOD OF DRILLING (cir	cle one)	3. ROGUIRES	
BORED (or Augered) JETTED	Jetted & <u>DRIVEN</u>	WRITE THE BOX NUMBI	ER
37	OTARY (Hydraulic Rotary)	FROM THE MAP HERE	
<u>CABLE</u> <u>REVerse-ROT</u> ary	DRive-POINT	5 6 4 4	
other		868	— ₀₀₀ ×
REPLACEMENT OR DEEPENEL	D WELLS	N 440	000
(CIRCLE APPROPRIATE BOX		DRAW A SKETCH BELOV	W SHOWING LOCATION OF WELL IN TOWNS AND ROADS AND GIVE
N THIS WELL WILL NOT REPLACE AN EX	· '	DISTANCE FROM WELL	TO NEAREST ROAD JUNCTION
THIS WELL WILL REPLACE A WELL TH		N Sec.	
ABANDONED AND SEALED		A ~37	
39 S THIS WELL WILL REPLACE A WELL TH AS A STANDBY	IN WILL BE USED	T -/	
D THIS WELL WILL DEEPEN AN EXISTING	WELL	1 2	
PERMIT NUMBER OF WELL TO BE REPLACE		10	
(IF AVAILABLE) 41	52	manus in	
Not to be filled in by driller (OEP U	SE ONLY)	Pd 20078)
APPROP. PERMIT NUMBER G	AP	,—	
54	63		
FORCE LIA INITIALS PERMIT No. AAA	रेरा-गामिज	j	
67 68 N BOX 70 71 72 7	73 74 75 76 77 78 79	J	
SPECIAL CONDITIONS			(MAMU)-1

C 1 4442 SEQUENCE NO.	STATE OF MARYLAND WELL COMPLETION REPORT	THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)	FILL IN THIS FORM COMPLETELY PLEASE PRINT OR TYPE	COUNTY NUMBER O2
ST/CO USE ONLY DATE Received DATE WELL COMPLETE	T Depth of Well	PERMIT NO. FROM "PERMIT TO DRILL WELL"
11111 0/25/3	22/1/2 26	AA-RR-6136
13 15 20 OWNER 1 \$ Acm	(TO NEAREST FOOT)	28 29 30 31 32 33 84 35 36 37
STREET OR RFD last name	first name TOWN	- ++ 17 -11 Le 1-1755
SUBDIVISION	SECTION	LOT
Not required for driven wells STATE THE KIND OF FORMATIONS	GROUTING RECORD WELL HAS BEEN GROUTED (Circle Appropriate Box)	C 3
PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING	TYPE OF GROUTING MATERIAL CEMENT CM BENTONITE CLAY BC	HOURS PUMPED (nearest hour)
DESCRIPTION (Use FEET Check if water bearing	NO. OF BAGS NO. OF POUNDS	PUMPING RATE (gal. per min.
ToPsen 0' 1'	GALLONS OF WATER/Z DEPTH OF GROUT SEAL (to nearest foot)	to nearest gal.) 11 15 METHOD USED TO
700 5074 1'	from ft. to ft.	MEASURE PUMPING RATE LAUNCE WATER LEVEL (distance from land surface)
5120 14 1' 5120 14'	48 TOP 52 54 BOTTOM 58 (enter 0 if from surface)	BEFORE PUMPING 17 20
51120 14	casing types types insert ST CO	WHEN PUMPING
	appropriate STEEL CONCRETE	22 25 TYPE OF PUMP USED (for test)
	code below PLASTIC OTHER	A air P piston T turbine
	MAIN Nominal diameter Total depth CASING top (main) casing of main casing TYPE (nearest inch) (nearest foot)	C centrifugal R rotary other (describe below)
	P (hearest horr) (hearest horr)	J jet Submersible
	60 61 63 64 66 70	PAILTA
•	E OTHER CASING (if used) C diameter depth (feet) H inch from to	PUMP INSTALLED
	C S S S S S S S S S S S S S S S S S S S	DRILLER WILL INSTALL PUMP YES NO
	s-zc	(CIRCLE) (YES or NO) IF DRILLER INSTALLS PUMP, THIS SECTION
	screen type SCREEN RECORD	MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE
	or open hole ST BR HO	TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O)
	(appropriate) STEEL BRASS OPEN BRONZE HOLE	IN BOX - SEE ABOVE: CAPACITY:
	below PLASTIC OTHER	GALLONS PER MINUTE (to nearest gallon)
	C 2	PUMP HORSE POWER 37 41 PUMP COLUMN LENGTH
	DEPTH (nearest ft.)	(nearest ft.) CASING HEIGHT (circle appropriate box
	A 8 9 11 15 17 21	+ above and enter casing height)
	H 2 30 32 36	below LAND SURFACE (nearest foot)
CIRCLE APPROPRIATE LETTER A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED	R S	LOCATION OF WELL ON LOT
E ELECTRIC LOG OBTAINED	SLOT SIZE 1.210 2 3	A SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR
P TEST WELL CONVERTED TO PRODUCTION WELL	DIAMETER (NEAREST	N LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES
HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION"	OF SCREEN 56 (NCH) from 7 to 1/	(MEASUREMENTS TO WELL)
AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRE- SENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF	GRAVEL PACK	(All berger
MY KNOWLEDGE.	CLONAUNO NACELL INFOCEST	nes ming y
DE TRS IDENT. NO.	OEP USE ONLY	125
DRILLERS SIGNATURE	(NOT TO BE FILLED IN BY DRILLER) T (E.R.O.S.) W Q	Jule's Bo.
(MUST MATCH SIGNATURE ON APPLICATION)	70 72 74 75 76	5) 5
SITE SUPERVISOR (sign. of driller or journeyman	TELESCOPE LOG OTHER DATA CASING INDICATOR	Ş
responsible for sitework if different from permittee)	CASING INDICATOR DRILLER	

B 101651 SEQUENCE NO.	STATE OF	MARYLAND	STATE PERMIT NUMBER
(b) ook one./	APPLICATION FOR PE	RMIT TO DRILL WELL	44-178-191136
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)	please pri	nt or type	70 fill in this form completely 79
Date Received (APA)		B 3	LOCATION OF WELL
OHIDAGS OWNER INFORMA	ATION	1 2	
8 13		BCOUNTY AR	4 M/ E 4 1 21 21
15 Last Name Owner	First Name 34		
PATHYENT WILD	LIFECTE	23 SUBDIVISION	42
36 Street or RFD	55 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	SECTION 44 46	LOT 48 50
LAUREL 1	7) D 40 100 State 72 Zip 76	FUAT ME	ADE
DRILLER INFORMATIO	N	52 NEAREST TOWN	
IAM A VOLEN	492	MILES FROM TOWN (enter	73 76 77 78
Oriller's Name	77 License No. 80	B 4	LEMONS BRIDGE Rd
Firm Name	1:	DIRECTION OF WELL FROM	11 NEAR WHAT ROAD 30
8918 Honomon le Colum	DIA 1710 21015	TOWN (CIRCLE BOX)	NORTH
Dan G Volem	1-11-92	NW B NE	ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX)
Signature	Date	8-9 8-9	WEST S EAST
B 2 WELL INFORMATION		W TOWN E	SOUTH
ÄPPROX. PUMPING RATE (GAL. PER MIN.)	12	8	34 3 50 37
AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY)		SW S 8-9	DISTANCE FROM ROAD
(GAL. FER DAT)	20	8-9 S 8-9	ENTER FT or MI 7 38 39
USE FOR WATER (CIRCLE APPRO	PRIATE BOX)		NOT TO BE FILLED IN BY DRILLER
D HOME (SINGLE OR DOUBLE HOUSEHO		Ι Λ Λ '	HEALTH DEPARTMENT APPROVAL
F FARMING (LIVESTOCK WATERING & AG IRRIGATION)	RICULTURAL	COUNTY NAME	COUNTY NO.
INDUSTRIAL, COMMERCIAL, STATE AND		STATE	INSERT S
22 L. OTHER (REQUIRES APPROPRIATION PE		SIGNATURE	INSERT S 41
P APPROPRIATION PERMIT AND STATE HI	EALTH DEPARTMENT	011212	KIDE
APPROVAL) TEST, OBSERVATION, MONITORING (MA	Y REQUIRE	43 48 CC NORTH /L / / O O	O SIGNATURE EXP. DATE
APPROPRIATION PERMIT)		GRID 4-14-17-10-10-50	55 GRID 57 63
[3]0]	\top	SHOW MAJOR FEATURE BOX & LOCATE WELL _	S OF
APPROXIMATE DEPTH OF WELL 24	FEET 28	WITH AN X	
L	NEAREST	SOURCES OF DRILLING	WATER
APPROXIMATE DIAMETER OF WELL	INCH		
METHOD OF DRILLING (cir	cle one)	3. ROGUIRED	
BORED (or Augered) JETTED	Jetted & <u>DRIVEN</u>	WRITE THE BOX NUMBI	ER
37	OTARY (Hydraulic Rotary) DRive-POINT	FROM THE MAP HERE	
<u>CABLE</u> <u>REV</u> erse <u>-ROT</u> ary	DINE-TONT	E 868	¬ † ×
other		NULLO	000
REPLACEMENT OR DEEPENEL	O WELLS	11 440	W SHOWING LOCATION OF WELL IN
(CIRCLE APPROPRIATE BOX	3)	RELATION TO NEARBY	N SHOWING LOCATION OF WELL IN TOWNS AND ROADS AND GIVE
THIS WELL WILL NOT REPLACE AN EX		DISTANCE FROM WELL	TO NEAREST ROAD JUNCTION
THIS WELL WILL REPLACE A WELL THE	IAI WILL BE	N	•
39 S THIS WELL WILL REPLACE A WELL TH	IAT WILL BE USED	1 1 2 3 1	
D THIS WELL WILL DEEPEN AN EXISTING	WELL		
PERMIT NUMBER OF WELL TO BE REPLACE	D OR DEEPENDED		
(IF AVAILABLE) 41	52	D d	
Not to be filled in by driller (OEP U	SE ONLY)	TRAIN	
APPROP. PERMIT NUMBER G	AP	TIRE (150'-	-7(X)
54	63	Pd FEST	
FORCE WRITE INITIALS PERMIT No. 70 71 72 7	3 74 75 76 77 78 79	/	
SPECIAL CONDITIONS			ONAMU-2
			1 11 11 11 11 11 11 11 11 11 11 11 11 1

C1 4443 SEQUENCE NO.	STATE OF MARYLAND	THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.				
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)	WELL COMPLETION REPORT FILL IN THIS FORM COMPLETELY PLEASE PRINT OR TYPE	COUNTY NUMBER O2.				
ST/CO USE ONLY DATE Received DATE WELL COMPLETING TO THE PROPERTY OF THE PROPE		PERMIT NO. FROM "PERMIT TO DRILL WELL" 28 29 30 31 32 33 64 35 36 37				
OWNER 115 Page 1	(IO NEAREST FOOT)	20 20 00 00 00 00 00 00				
STREET OR RFDlast name	first name TOWN	1 1/10 -4075				
SUBDIVISION	SECTION	LOT				
WELL LOG Not required for driven wells STATE THE KIND OF FORMATIONS	WELL HAS BEEN GROUTED (Circle Appropriate Box)	C 3				
PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING	TYPE OF GROUTING MATERIAL	HOURS PUMPED (néarest hour)				
DESCRIPTION (Use FEET Check if water bearing	NO. OF BAGS NO. OF POUNDS 1526	PUMPING RATE (gal. per min.				
TEPSOIL O' 1'	GALLONS OF WATER DEPTH OF GROUT SEAL (to nearest foot)	to nearest gal.) METHOD USED TO MEASURE PUMPING RATE				
The one go I'	from 48 TOP 52 ft. to 54 BOTTOM 58	WATER LEVEL (distance from land surface)				
	(enter 0 if from surface) Casing CASING RECORD	BEFORE PUMPING				
15,700,50000	types insert appropriate STEEL CONCRETE	WHEN PUMPING 22 25 TYPE OF PUMP USED (for test)				
	code below PLASTIC OTHER	A air P piston II turbine				
	MAIN Nominal diameter Total depth CASING top (main) casing of main casing	C centrifugal R rotary Other (describe below)				
	TYPE (nearest inch) (nearest foot)	jet Submersible				
	60 61 63 64 66 70	Mysiler-				
	C OTHER CASING (if used) A diameter depth (feet)					
	inch from to	PUMP INSTALLED				
	\$	DRILLER WILL INSTALL PUMP YES (NO (CIRCLE) (YES or NO) IF DRILLER INSTALLS PUMP, THIS SECTION				
	screen type SCREEN RECORD	MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE				
	or open hole ST BR HO	TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O)				
	(appropriate) STEEL BRASS OPEN BRONZE HOLE	IN BOX - SEE ABOVE: CAPACITY: GALLONS PER MINUTE				
	below PLASTIC OTHER	(to nearest gallon) PUMP HORSE POWER				
		PUMP COLUMN LENGTH				
	DEPTH (nearest ft.)	(nearest ft.) CASING HEIGHT (circle appropriate box				
	E 8 9 11 15 17 21	above and enter casing height)				
	H 2	LAND SURFACE [nearest foot)				
CIRCLE APPROPRIATE LETTER A WELL WAS ABANDONED AND SEALED	E 3	LOCATION OF WELL ON LOT				
WHEN THIS WELL WAS COMPLETED E ELECTRIC LOG OBTAINED	SLOT SIZE + 20 2 3 3	A SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR				
P TEST WELL CONVERTED TO PRODUCTION WELL	DIAMETER (NEAREST INCH)	N LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES				
IHEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION"	56 60 from / to //	(MEASUREMENTS TO WELL)				
AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT. AND THAT THE INFORMATION PRE- SENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF	GRAVEL PACK LY IF WELL DRILLED WAS	130, 1752				
MY KNOWLEDGE	FLOWING WELL INSERT F IN BOX 68 68	722 121 5 8				
PILLERS IDENT. NO.	OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)	F 10.				
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)	T (E.R.O.S.) W O	Access, 1				
(ilini X.K.	70 72					
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)	TELESCOPE LOG OTHER DATA CASING INDICATOR	77				
	DRILLER					

04.050 0504540540	OTATE OF	MADVI AND	STATE PERMIT NUMBER				
B 1 01652 SEQUENCE NO. (DP USE ONLY)	STATE OF I		WALGE-01127				
1 2 3 (THIS NUMBER IS TO BE PUNCHED	,	nt or type `	70 fill in this form completely 79				
IN COLS. 3-6 ON ALL CARDS)	please pri						
Date Received (APA)		B 3	LOCATION OF WELL				
OWNER INFORMA	ATION	ANNE AR	anned 1				
8 13	1== 1<110	8 COUNTY	21				
15 Last Name Owner	First Name 34						
MATUXENT WILD	LIFECTR	23 SUBDIVISION	**				
36 Street or RFD	55	SECTION 44 46	LOT 48 50				
LAYREU III	カシレフ 0 そ State 72 Zip 76	FORT ME	ANE				
		52 NEAREST TOWN	71				
IAN A VOLEN	N 442	MILES FROM TOWN (ente	r 0 if in town) 73 76 77 78				
Driller's Name	77 License No. 80	B 4					
ATTEC		DIRECTION OF WELL FROM	LEMONS BRIDGE 11 NEAR WHAT ROAD 30				
8918 HERRMANN Dr Cok	SKOIEPW AIGHT	TOWN (CIRCLE BOX)	NORTH				
Address		N N	ON MUICH SIDE OF BOAD				
Signature Uolond	/- //- / <u>3_</u> Date	NW 8 NE 8-9	(CIRCLE APPROPRIATE BOX) WEST SEAST				
B 2 WELL INFORMATION			SOUTH				
APPROX. PUMPING RATE (GAL. PER MIN.)		W TOWN E					
- 8	12		34 3 5 37 DISTANCE FROM ROAD				
AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY)		S _W S 8-9	F				
14	20	8	ENTER FT or MI 38 39				
USE FOR WATER (CIRCLE APPRO	PRIATE BOX)		NOT TO BE FILLED IN BY DRILLER				
D HOME (SINGLE OR DOUBLE HOUSEHO	LD UNIT ONLY)	1 1	HEALTH DEPARTMENT APPROVAL				
FARMING (LIVESTOCK WATERING & AGI	RICULTURAL	COUNTY NAME 1	COUNTY NO.				
INDUSTRIAL, COMMERCIAL, STATE AND	FEDERAL GOV.	STATE					
22 U OTHER (REQUIRES APPROPRIATION PE	RMIT)	SIGNATURE	INSERT S				
PUBLIC OR PRIVATE WATER COMPANY P APPROPRIATION PERMIT AND STATE HE	EALTH DEPARTMENT	011272	1 Rise				
APPROVAL)	V 0501105	MODELL SLEET	O SIGNATURE EXP. DATE				
TEST, OBSERVATION, MONITORING (MA'	Y REQUIRE	GRID 4 0 0 0	63 GRID 57 63				
		SHOW MAJOR FEATURE	ES OF				
APPROXIMATE DEPTH OF WELL 30	FEET	BOX & LOCATE WELL _ WITH AN X					
24	28	SOURCES OF DRILLING	WATER				
APPROXIMATE DIAMETER OF WELL	NEAREST INCH	1. None					
		2. Day in the					
METHOD OF DRILLING (cir		3. ROGUIZED					
BORED (or Augered) JETTED ADD REPOWERED	Jetted & <u>DRIVEN</u> ROTARY (Hydraulic Rotary)	WRITE THE BOX NUMB FROM THE MAP HERE	ER				
37	DRive-POINT	† (10 m) (11 m) (
<u>CABLE</u> <u>REV</u> erse-RO1ary	<u>Di</u> no <u>Louri</u>	E 568					
other		N 110	000				
REPLACEMENT OR DEEPENEL	D WELLS	" 440	W SUCIALIST OF WELL IN				
(CIRCLE APPROPRIATE BOX		DRAW A SKETCH BELO RELATION TO NEARBY	W SHOWING LOCATION OF WELL IN TOWNS AND ROADS AND GIVE				
THIS WELL WILL NOT REPLACE AN EX		DISTANCE FROM WELL	TOWNS AND ROADS AND GIVE TO NEAREST ROAD JUNCTION				
THIS WELL WILL REPLACE A WELL TH	AT WILL BE	N ist	¥				
39 THIS WELL WILL REPLACE A WELL TH	IAT WILL BE USED	A 37					
AS A STANDBY		2					
D THIS WELL WILL DEEPEN AN EXISTING		 \$					
PERMIT NUMBER OF WELL TO BE REPLACE	ED OR DEEPENDED	, e					
		TRAINFIRE					
Not to be filled in by driller (OEP U	ISE ONLY)	Pd 150'					
APPROP. PERMIT NUMBER G	AP		2)5' (V)				
WRITE 54	63	/ / ·					
FORCE INITIALS PERMIT No.	N-MIBIZ	/					
67 68 70 71 72 7	73 74 75 76 77 78 79						
SPECIAL CONDITIONS		/	6)Amul - 3				

Appendix H: DPDO Salvage Yard and Transformer Storage Analytical

Results

(DPDO currently known as DRMO)

Table DSY-1: PCBs in Surficial Soil at the DSY

Table DSY-2: Field Screening and Metals Data for Ground Water from the DSY

Table DSY-3: Volatile Organic Compounds in Ground Water from the DSY

Table DSY-4: Semivolatile Organic Compounds in Ground Water from the DSY

Note: The term "LT" indicates that a certified analyte is not detected. The term "ND" is used for analytes that are added to certified methods but have not gone through the certification process. The term "LT" is followed by the certified reporting limit, it does not signify that a compound was actually detected but not included because results were below the Contract Required Detection Limit.

Table DSY-1: PCBs in Surficial Soil at the DSY Fort George G. Meade, Maryland Page 1 of 1

h (ft bgs) n (ft bgs)	D1A0200Y	930C-400 Q1AD400Y	868 9¥	SS-201 D1A0201Y	SS-202 D1A0202Y	SS-203 D1A0203Y	SS-204 D1A0204Y	SS-205 D1A0205Y
Modia	0.5		0.5	0.50	0.50	0.05	0 10	0.0
QC Type	င္လ	C Dup. of	CSO Dup. of SS-200	OSO	OS:	88	88	883
PCBs (ug/g)								
PCB 1016	0.1			0.1	0.1	0.1	0.1	Г
PCB 1221	0.1			0.1	0.1	0.1	0.1	
PCB 1232	0.1			0.1	0.1	0.1	0.1	
PCB 1242	0.1			0.1	0.1	0.1	0.1	
PCB 1248	0.1	2	0.1 ND	0.1	O.1 ND	0.1 ND	0.1 ND	0.1 ND
PCB 1254	0.048			0.048	0.048	0.048	0.048	
PCB 1260	0.314	o	271	4	0.752	0.599	1.53	
TOTAL PCBs	3.1	,	0.27	4	0.75	0.6	8	•
	02-Feb-93	02-Fet	-93	02-Feb-93	02-Feb-93	03-Feb-93	03-Feb-93	1 03-Feb-93
	4-Feb-93	04-Feb-93	83	04-Feb-93	04-Feb-93	09-Feb-93	09-Feb-93	09-Feb-93
Analysis Date: 09-	09-Feb-93	09-Feb-93	66	09-Feb-93	09-Feb-93	17-Feb-93	17-Feb-93	17-Feb-93

Notes (1)LT = less than detection limit; ND = Not Detected

TABLE DSY-2: Field Screening and Metals Data for Ground Water from the DSY Fort George G. Meade, Maryland Page 1 of 2

Page 1 of 2	Sample Location Identification COE-1 Field Sample ID Site Type WELL Screen Start Depth (it bgs) 24.5 Screen End Depth (it bgs) 34.5	Vedia CGW Total/Dissovled Total	FIELD PARAMETERS	pH Conductivity(umhos/cm2) 0.196 Temperature(C) 12.7 Turbidity(NTU) 5	METALS (ug/L)	2240 60 LT		1.12 1.7		16.8 LT	21.8 21.8	9130 4.47 LT	Wagnesium 4040	0.00	Volyboenum 52.7 LT	253 LT			59.9 LT 27.6 LT 67.5	TOTAL HEAVY METALS (1) 0	23-
	COE-1 D1M0001Z WELL 24.5 34.5	CGW Dissolved				_	_	1.12 1.12 1.12 1.12		16.8 LT		286 4.47 LT					-		59.9 LT 27.6 LT 71.4	0 38598	23-Feb-93
	MW-42 D1M0042Y WELL 35 45	CGW		4.85 0.303 12.1 0		12300 60 LT		1.12 LT 457	6.78 LT	254	56.5	34800	12100 158		32.1 LT	2.53 LT	_	118 LT 125 LT	59.9 LT 65.6 127	270	24-Feb-93
	MW-42 D1M0042Z WELL 35 45	CGW Dissolved				197 60 LT	_	1.12 LT	6.78 LT	-	18.8 LT	99.9 4.47 LT			32.7 LT	2.53 LT	_		59.9 LT 27.6 LT 105	98	24-Feb-93
	930C-452 Q1XD452Y WELL 35 45	CGW Total Duplicate of MW				26900 60 LT		2:5	6.78 LT	45 45 1	97.4 97.4	55800 15.1	13100	_	32.1 LT	2.53 LT			59.9 LT 114 125	368	24-Feb-93
	930C-452 Q1XD452Z WELL 35 45	CGW Dissolved				191 60 LT	_	1.12 LT 354	6.78 LT	-	18.8 17.8.51					253 LT			59.9 LT 27.6 LT 80.8	92	24-Feb-93
	MW-43D D1M043DY WELL 82 92			4.72 0.595 9.8 2	3	249 60 LT	2.35 LT	1.15 23.15 7.17				203 4.47 LT					75000		59.9 LT 27.6 LT	0	24-Feb-93
	MW-43D D1M043DZ WELL 82 92	CGW Dissolved				112 LT 60 LT		1.12 230 1.T		-	18.8 LT	84.4 4.47 LT			32.1 LT	13900 2.53 LT	_		59.9 LT 27.6 LT 25.7	19	24-Feb-93

(1) Heavy Metals include Sb,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag; LT = less than detection limit; ND = Not Detected

TABLE DSY-2: Field Screening and Metals Data for Ground Water from the DSY Fort George G. Meade, Maryland Page 2 of 2

9300-153 9300-1		258 58 58 58 58 56 56 57 58 58 58 58 58 58 58 58 58 58 58 58 58	0 0 23 Feb-93 23 Fe
MW-201 D1M0201Z WELL 26 CGW CGW		25.36 FT 1.28	0 43948 18-Mar-93
MW-201 D1M0201Y WELL 26 CGW Total	4.68 0.181 999	586 6.38 CT 1.10 CT 1.20 CT 1.20 CT 1.82 CT 1.83 CT 1.83 CT 1.83 CT 1.83 CT 1.83 CT 1.84 CT 1.85 CT 1.	22 55036 18-Mar-93
MW-200 D1M0200Z WELL 47 47 CGW Dissolved		2.596 CTT	0 47734 23-Feb-93
MW-200 D1M0200Y WELL 47 47 CGW Total	4.46 0.226 11.9	430 636 112 112 112 112 112 113 114 115 115 116 116 116 117 118 118 119 119 119 119 119 119	0 44063 23-Feb-93
MW43S D1M043SZ WELL WELL 30 40 CGW Dissolved		2.35 LT 1.30 L	133299 24-Feb-93
MW43S D1M043SY WELL WELL 30 40 CGW	4.21 0.778 11.7	18100 1.733 1.733 1.730 1.	128 216455 24-Feb-93
Sample Location Identification Sample Location Identification Site Type Screen Start Depth (ft bgs) Screen End Depth (ft bgs) Addia Total/Dissoyled	GC Type FIELD PARAMETERS pH Conductivity(umhos/cm2) Temperature(C) Turbidity(NTU)	METALS (ug/L) Autminum Antimony Arsenic Barium Beryllium Beryllium Cadmium Cadmium Cadmium Cabatt Copper Iron Lead Manganese Manganese Manganese Mercury Nolybdenum Nickel Nolybdenum Silver Sodium Tellunium Tellunium Tin	TOTAL HEAVY METALS (1) TOTAL METALS Collection Date:

nodes: (1) Heavy Metals include Sb,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag; LT = less than detection limit; ND = Not Detected

TABLE DSY-3: Volatile Organic Compounds in Ground Water from the DSY Fort George G. Meade, Maryland Page 1 of 2

Sample Location Identification Field Sample ID Site Type Screen Start Depth (ft bgs) Screen End Depth (ft bgs) Media QC Type	COE-1 D1M0001 WELL 24.5(2) 34.5(2) CGW	MW-42 D1M0042 WELL 35(2) 45(2) CGW	93QC-452 Q1XD452 WELL 35(2) 45(2) CGW Dup. of MW-42	MW-43D D1M043D WELL 82(2) 92(2) CGW	MW-43S D1M043S WELL 30(2) 40(2) CGW	MW-200 D1M0200 WELL 47 57 CGW
VOLATILE ORGANIC COMPOUNDS(ug	g/L)					
AROMATICS			111	111	1.0	1 LT
Benzene	1 LT 1 LT	1 LT 1 LT	1 LT 1 LT	1 1	i Li	iti
Toluene	남	1 1	i Lit	iti	i Lt	i [t]
Ethylbenzene		1 1	i lit	i lit	i LŤ	i LT
1,3-Dimethylbenzene		ż Lt			2 LT	2 LT
Xylenes Styrene	2 LT 5 ND	5 ND	2 LT 5 ND	2 LT 5 ND	5 ND	5 ND
Stylene		02				
CHLORINATED AROMATICS				, .,	7.1	
Chlorobenzene	1 LT	1 LT	1 LT	1 LT	1 LT	1 LT
1,3-Dichlorobenzene	1 LT	1 LT	1 LT	1 <u>LT</u>	1 LT	1 [[
Dichlorobenzene, Nonspecific	2 LT	2 LT	2 LT	2 LT	2 LT	2 LT
HALOCENATED ODCANICS						
HALOGENATED ORGANICS Chloromethane	1.2 LT	1.2 LT	1.2 LT	1.2 LT	1.2 LT	1.2 LT
Chloromethane Bromomethane	14 LT	14 LT	14 LT	14 LT	14 LT	14 LT
	12 LT	12 LT	12 LT	12 LT	12 LT	12 LT
Vinyl Chloride Chloroethane	'8 LT	8 LT	's LT	B LT	8 LT	8 LT
Methylene Chloride	1 1	ı i it	1 LT	ĩ LŤ	1 LT	1 LT
1.1-Dichloroethene	i Liti	12	11	i LT	1 LT	1 LT
1,1-Dichloroethane	l itil	וו וו	i LT	i LT	1 LT	1 LT
1,2-Dichloroethylenes	5 LT	5 LT	5 LT	5 LT	5 LT	5 LT
Chloroform	ا آ آ آ	1 LT	1 LT	1 LT	1 LT	1 LT
1,2-Dichloroethane	l i līt	i LT	i LT	i LT	1 LT	1 LT
1.1.1-Trichloroethane	i LT	34	33	1 LT	1 LT	22
Carbon Tetrachloride	i LT	1 LT	1 LT	1 LT	1.7	1 LT
Bromodichloromethane	1 LT	1 LT	1 LT	1 LT	1 <u>LT</u>	1 LT
1,2-Dichloropropane	1 LT	1 LT	1 LT	1 LT	1 LT	1 11
Trichloroethene	1 LT	1 LT	1 LT	1 LT	1 LT	ᅧᅜ
1,3-Dichloropropane	4.8 LT	4.8 LT	4.8 LT	4.8 LT	4.8 LT	4.8 LT
Dibromochloromethane	1 LT	1 LT	1 LT	1 LT	1 LT	1 [[
1,1,2-Trichloroethane	1 LT	1 LT	1 LT	1 LT	1 LT	1 LT
2-Chloroethylvinyl Ether	3.5 LT	3.5 LT	3.5 LT	3.5 LT	3.5 LT	3.5 LT
Bromoform	11 LT	11 LT	11 LT	11 LT	11 LT	11 LT 1.5 LT
1,1,2,2-Tetrachloroethane	1.5 LT	1.5 LT	1.5 LT	1.5 LT 1 LT	1.5 LT 2.7	150 GT
Tetrachloroethene	1 LT	49	46 5 ND	1 LT 5 ND	5 ND	5 ND
Carbon Disulfide	5 ND	5 ND		5 ND	5 ND	5 ND
Cis-1,3-Dichloropropene Trans-1,3-Dichloropropene	5 ND 5 ND	5 ND 5 ND	5 ND 5 ND	5 ND	5 ND	5 ND
		•				
WATER SOLUBLE		8 LT	8 LT	8 LT	8 LT	8 LT
Acetone	8 LT 10 LT	8 LT 10 LT	8 LT 10 LT	10 LT	10 LT	10 LT
2-Butanone	1.4 LT	1.4 LT	1.4 LT	1.4 LT	1.4 LT	1.4 LT
4-Methyl-2-Pentanone 2-Hexanone	1.4 L1 1 ND	1 ND	1 ND	1 ND	1 ND	1 ND
OTHER	64 17	8.4 LT	8.4 LT	8.4 LT	8.4 LT	8.4 LT
Acrylonitrile	8.4 LT 1 LT	6.3	6.4 L1	0.4 LT	1 LT	7.8
Trichlorofluoromethane Vinyl Acetate	1 ND	1 ND	1 ND	1 ND	1 ND	7.0 1 ND
, n.y., wonder						
TOTAL VOCs	0	102	96	0	04 5-5-00	180
Collection Date:	23-Feb-93	24-Feb-93	24-Feb-93	24-Feb-93	24-Feb-93	23-Feb-93
Extraction Date:	06-Mar-93	07-Mar-93	07-Mar-93	07-Mar-93	01-Apr-93	06-Mar-93
Analysis Date:	06-Mar-93	07-Mar-93	07-Mar-93	07-Mar-93	01-Apr-93	06-Mar-93

NOTES:
(1) LT= Less than detection limits; ND= Not detected, GT = Greater than detection limit
(2) Depth based on total depth measurements assuming a 10-ft screen and a 2.5-ft stickup (no well log available)

TABLE DSY-3: Volatile Organic Compounds in Ground Water from the DSY of George G. Meade, Maryland age 2 of 2

Sample Location Identification	MW-201	_	93QC-153		93QC-253
Field Sample ID	D1M0201		Q1XF153Y		Q1XR253Y
Site Type	WELL		FBLK		RNSW
Screen Start Depth (ft bgs)	26		I DUN		FWOV
			_		-
Screen End Depth (ft bgs)	36		-		0011
Media	CGW		CSW		CSW
QC Type			Field Blank		Rinse Water
VOLATILE ORGANIC COMPOUNDS(ug/L)					
AROMATICS					
Benzene			1	LT	1 11
Toluene		ᄪ	1	LT	1 LT
Ethylbenzene		LT	1	LT	1 LT
1,3-Dimethylbenzene		LT	1	LT	1 LT
Xylenes		LT	2	LT	2 LT
Styrene	5 1	ND	5	ND	5 ND
CHI ODINATED ADOMATICS					
CHLORINATED AROMATICS Chlorobenzene	1 1	П	1	LT	1.1
			1	LT	i LT
1,3-Dichlorobenzene		ᄪ			
Dichlorobenzene, Nonspecific	2 1	LT	2	LT	2 LT
HALOGENATED ORGANICS					
Chloromethane	1.2	ŒΪ	1.2	LT	1,2 LT
Bromomethane	14 1		14	LT	14 LT
Vinyl Chloride	12 1	ĹŤΙ		ĽΤ	12 LT
Chloroethane		Ľή	8	ĽŤ	B LT
Methylene Chloride		ĽŤΙ	1	ĽΤ	ĭĽŤ
1.1-Dichloroethene		ĹŤΙ	i	ĽŤ	i Li
1,1-Dichloroethene			i	ĽΉ	iti
			5	ĽŤ	5 LT
1,2-Dichloroethylenes		ᄪ		LI	
Chloroform	1.6	. . .	1.1		1
1,2-Dichloroethane		ᄪ	1	ĻŢ	1 11
1,1-Trichloroethane		LT	1	LT	1 LT
urbon Tetrachloride	1.5	_ [1	LT	1 LT
omodichloromethane		LT	1	LT	1 LT
1,2-Dichloropropane	1 1	LT	6.5		6
Trichloroethene	1 1 1	LT	1	LT	1 LT
1,3-Dichloropropane	4.8 L	LT I	4.8	LT	4.8 LT
Dibromochloromethane	1 1	LT	1	LT	1 LT
1,1,2-Trichloroethane	1 1	LT	1	LT	1 LT
2-Chloroethylvinyl Ether		ĽŤΙ	3.5	LT	3.5 LT
Bromoform		ĒΫΙ	11	LT	11 LT
1,1,2,2-Tetrachioroethane	1.5		1.5		1.5 LT
Tetrachloroethene	4.9	-'	1.0	ĽΤ	2.2
Carbon Disulfide		ND	5	ND	5 ND
		עם מא	5	ND	5 ND
Cis-1,3-Dichloropropene Trans-1,3-Dichloropropene		טא סא	5	ND	5 ND
	"		J	.,,	5 115
WATER SOLUBLE		\dashv		-	8 17
Acetone	8 1	Ţ	8	LT	8 LT
2-Butanone	10 [LŢ	10 LT
4-Methyl-2-Pentanone	1.4 L		1.4	ND	1.4 LT 1 ND
2-Hexanone	1 1	ND	1	טא	I NU
OTHER					
Acrylonitrile	8.4 L		8.4	LT	8.4 LT
Trichlorofluoromethane	1 1	LT	1	LT	1 LT
Vinyl Acetate		ND	1	ND	1 ND
TOTAL VOCs	8		8		٥
Collection Date:	18-Mar-93	-	22-Feb-93		23-Feb-93
					06-Mar-93
Extraction Date:	01-Apr-93		06-Mar-93		
Analysis Date:	01-Apr-93		06-Mar-93		06-Mar-93

NOTES:
(1) LT= Less than detection limits; ND= Not detected, GT = Greater than detection limit
(2) Depth based on total depth measurements assuming a 10-ft screen and a 2.5-ft stickup (no well log available)

TABLE DSY-4: Semivolatile Organic Compounds in Ground Water from the DSY

Fort George G. Meade, Maryland Page 1 of 4 MW-42 D1M042Y MW-43S D1M043SY MW-200 D1M0200Y 93QC-452 Q1X0452Y MW-43D D1M043DY Sample Location Field Sample ID COE-1 D1M001Y dentification D1M0201Y WELL 30(2) 40(2) CGW WELL WELL WELL WELL WELL WELL Site Type Screen Start Depth (ft bgs) 24.5(2) 25.5(2) CGW 35(2) 45(2) CGW 82(2) 92(2) CGW 35 36 CGW 57 Screen End Depth (ft bgs)
Media
Total/Dissolved 45 CGW CGW Total Total Total Total Total Total Total Dup. of MW-42 QC Type SEMIVOLATILE ORGANIC COMPOUNDS (ug/L) CHLORINATED MONOCYCLIC AROMATICS 1.3-Dichlorobenzene 1.5 LT 1.2 LT 2.4 LT 1.5 LT 1.2 LT 2.4 LT 5.8 LT 12 LT 1.5 LT 1.2 LT 2.4 LT 1.5 1.2 2.4 LT LT LT LT 1.5 1.2 2.4 1.5 1.2 2.4 LT LT LT 1.5 1,4-Dichlorobenzene 1.2-Dichlorobenzene 2.4 1,2,4-Trichlorobenzene 5.8 5.8 5.8 12 LT 5.8 12 LT LT LT 5.8 LT LT 5.8 12 LT 1,2,3-Trichlorobenzene 12 Hexachlorobenzene NITROSAMINES 97 9.7 N-Nitroso Dimethylamine 6.8 LT 3.7 LT LT 6.8 3.7 LT 6.8 3.7 LT 6.8 3.7 6.8 LT 3.7 LT 6.8 LT 3.7 LT 6.8 LT 3.7 LT N-Nitroso Di-N-Propylamine N-Nitroso Diphenylamine NITROMONOCYCLIC AROMATICS Nitrobenzene 2.9 LT 6.7 LT 5.8 LT 2.9 LT 6.7 LT 5.8 LT 2.9 6.7 5.8 2.9 6.7 2.9 6.7 5.8 LT 2.9 6.7 5.8 LT LT 2.9 6.7 5.8 LT 3-Nitrotoluene 2.6-Dinitrotoluene 2,4-Dinitrotoluene PHOSPHORUS CONTAINING 130 LT 21 LT 130 LT 21 LT 130 LT 21 LT 130 LT 21 LT 130 130 LT 21 LT 130 LT 21 LT 130 LT 21 LT Dimethylmethyl Phosphate Diisopropylmethyl Phosphonate PCBs PCB 1016 9.1 ND 7.2 9.9 5.2 38 33 7.2 9.9 5.2 38 33 7.2 9.9 5.2 38 33 7.2 9.9 5.2 38 33 55555 55555 7.2 9.9 5.2 888 7.2 9.9 5.2 ND ND ND ND ND ND ND 7.2 9.9 5.2 38 33 13 ND ND ND PCB 1221 PCB 1232 PCB 1242 ND ND ND ND NO NO 38 33 2200 ND ND ND ND ND PCB 1248 38 PCB 1254 33 13 ND 13 ND 13 ND ND PCB 1260 13 NO 13 13 **PHENOLS** 2.2 2.8 2.2 2.8 2.2 2.8 LT 2.2 2.8 2.2 2.8 2.8 3.6 8.2 2.2 2.8 LT Phenol LT 比 ĽŤ 2.8 ĽŤ 4-Methylphenol 2.8 3.6 8.2 2.8 3.6 2.8 3.6 8.2 2.8 3.6 8.2 2.8 3.6 8.2 ודו ודו ודו ודו ודו 2.8 3.6 8.2 4.4 8.4 8.5 דודו דודודו LT LT LT 2-Chlorophenol 2-Methylphenol 2-Nitrophenol 8.2 4.4 8.4 8.5 4.4 8.4 8.5 4.4 8.4 8.5 3.6 2.8 4.4 8.4 8.5 4.4 8.4 8.5 4.4 2,4-Dimethylphenol 2,4-Dichlorophenol 3-Methyl-4-Chlorophenol 8.4 8.5 3.6 2.8 LT LT 3.6 2.8 LŢ LT LT 3.6 2.8 LT LT 3.6 2.8 LT LT 3.6 2.8 LT 3.6 2,4,6-Trichlorophenol 2.8 2,4,5-Trichlorophenol 1.7 180 96 50 1.7 180 96 50 TTTT ST LT LT LT 1.7 180 96 50 9.1 1.7 180 96 50 9.1 1.7 180 96 50 LT LT LT 1.7 180 96 50 LŢ LT 1.7 LTLT 2,3,6-Trichlorophenol 180 96 50 9.1 2.4-Dinitrophenol 4-Nitrophenol ND LT ND NO ND ND LT Methyl-4,6-Dinitrophenol Pentachlorophenol POLYNUCLEAR AROMATICS 0.5 0.5 0.5 0.5 Naphinalene 1.3 2.6 1.3 2.6 LT 1.3 2.6 1.3 2.6 1.3 2.6 LT LT 1.3 2.6 1.3 2.6 LT LT LT LT 2-Methylnaphthalene 2-Chloronaphthalene 5.8 9.2 9.9 LT LT LT 5.8 9.2 9.9 בוד נד נד 5.8 9.2 9.9 5.8 9.2 9.9 5.8 9.2 9.9 5.8 9.2 9.9 5.2 17 24 9.8 7.4 10 10 5.8 9.2 9.9 5.2 17 24 9.8 7.4 10 10 14 21 12 Acenaphthene Fluorene Phenanthrene LT 5.2 17 24 5.2 17 24 LT LT LT 5.2 17 24 LT LT 5.2 17 24 9.8 7.4 10 10 5.2 17 24 9.8 7.4 10 Anthracene Pyrene Fluoranthene בו בו בו בו י און הואלי NET LITE ND LT LT LT LT LT Benzo [A] Anthracene Chrysene 9.8 7.4 10 10 14 21 12 ND 9.8 7.4 9.8 7.4 ND LT LT LT LT Benzo [B] Fluoranthene Benzo [K] Fluoranthene Benzo [A] Pyrene Indeno [1,2,3-C,D] Pyrene Dibenz [A,H] Anthracene 10 10 14 10 10 14 14

LT

21

12

Benzo [G,H,I] Perylene

LT LT

21

12

LT

21

12

LT LT LT

21

12

21 12 15

LT LT

LT

TABLE DSY-4: Semivolatile Organic Compounds in Ground Water from the DSY Fort George G. Meade, Maryland

age 2 of 4 Imple Location Identification Field Sample ID	COE-1 D1M001Y	MW-42 D1M042Y	93QC-452 Q1X0452Y	MW-43D D1M043DY	MW-43S D1M043SY	MW-200 D1M0200Y	MW-201 D1M0201Y
Site Type	WELL						
Screen Start Depth (ft bgs)	24.5(2)	35(2)	35	82(2)	30(2)	47	26
Screen End Depth (ft bgs)	25.5(2)		45	92(2) CGW	40(2)	57	36
Media	CĠW	45(2) CGW	CGW		CGW	CGW	CGW
Total/Dissolved	Total						
QC Type			Dup. of MW-42		L		L
SEMIVOLATILE ORGANIC COMPOUNDS	1						
(ug/L) PESTICIDES							
Beta-Hexachlorocydohexane	17 LT	17 LT	17 LI	17 LI	17 LT	17 LT	17
Alpha-Hexachlorocyclohexane	5.3 LT	5.3 LT	5.3 LT	5.3 LT	5.3 LT	5.3 LT	5.3
Atrazine	5.9 LT	5.9 LT	5.9 LT	5.9 LT	5.9 LT	5.9 LT	5.9
Lindane	7.2 LT	7.2 LT	7.2 LT	7.2 LT	7.2 LT	7.2 LT	7.2
Delta-Hexachlorocyclohexane	3 ND	3 ND		3 ND	3 ND	3 ND	3
Heptachlor	38 LT	38					
Bromacil	2.9 LT	2.9 LT	2.9 LT	2.9 LT	4.4	2.9 LT	8
Malathion	21 LT	21					
2,2-Bis (Para-Chlorophenyl)-1,1,1-Trichloroethane	18 LT	18 LT	18 LT	18 LT	18 LT	18 LT	18
Parathion	37 LT 13 LT	37 LT 13 LT	37 LT 13 LT	37 LT 13 LT	37 LT 13 LT	37 LT 13 LT	37 13
Aldrin	13 LT 19 LT	19 LT	19 LT	19 LT	19 LT	19 LT	19
Supona Isodrin	7.8 LT	7.8 LT	7.8 LT	7.8 LT	7.8 LT	7.8 LT	7.8
Heptachlor Epoxide	28 LT	28					
Vapona	8.5 LT	8.5 LT	8.5 LT	8.5 LT	8.5 LT	8.5 LT	8.5
Chlordane	37 ND	37					
Alpha-Endosulfan / Endosulfan I	23 LT	23					
2,2-Bis (Para-Chlorophenyl)-1,1-Dichloroethene Dieldrin	14 LT	14 LT	14 LT	14 LT	14 LT	14 LT	14
	26 LT	26					
Endrin Aldehyde	5 LT	5					
Endrin 2.2 Ris (Para Chlorophopul) 1.1 Dishlorophopo	18 LT 18 LT	18 LT 18 LT	18 LT 18 LT	18 LT 18 LT	18 LT 18 LT	18 LT 18 LT	18 I
2,2-Bis (Para-Chlorophenyl)-1,1-Dichloroethane		42 LT	42				
Beta-Endosulfan / Endosulfan II Endosulfan Sulfate	42 LT 50 LT	50 LT	50 LT	50 LT	50 LT	56 17	50
Methoxychior	11 LT	1 11					
Mirex	24 LT	24 1					
Endrin Ketone	6 ND			6 ND	6 ND	6 ND	6
Toxaphene	17 ND	17 ND		17 ND	17 ND	17 ND	17
PHTHALATES							
nethyl Phthalate	2.2 LT	2.2 LT	2.2 LT	2.2 LT	2.2 LT	2.2 LT	2.2 L 5.9 L
ethyl Phthalate	5.9 LT	5.9 LT	5.9 LT	5.9 LT	5.9 LT	5.9 LT	
Di-N-Butyl Phthalate	33 LT	33 L					
Butylbenzyl Phthalate	28 LT	28 L					
Bis (2-Ethylhexyl) Phthalate	7.7 LT 1.5 LT	7.7 LT 1.5 LT	7.7 LT 1.5 LT	7.7 LT 1.5 LT	7.7 LT 1.5 LT	7.7 LT 1.5 LT	7.7 L 1.5 L
Di-N-Octyl Phthalate	1.5 LT	1.5 L1	1.5 L1	1.5 LI	1.5 L1	1.5 L1	'5'
SULFUR CONTAINING ORGANICS							
4-Chlorophenylmethyl Sulfoxide	15 LT	15 [
4-Chlorophenylmethyl Sulfide	10 LT	10 L					
4-Chlorophenylmethyl Sulfone	5.3 LT	5.3 LT	5.3 LT	5.3 LT	5.3 LT	5.3 LT	5.3 L
OTHER							
1,4-Oxathiane	27 LT	27 []	27 LT	27 LT	27 LT	27 LT	27
Bis (2-Chloroisopropyl) Ether	5 LT	5					
Bis (2-Chloroethyl) Ether Dicyclopentadiene	0.68 LT 5.5 LT	0.68 LT 5.5 LT	0.68 LT 5.5 LT	0.68 LT 5.5 LT	0.68 LT 5.5 LT	0.68 LT 5.5 LT	0.68 5.5
Dicyclopentaciene Benzyl Alcohol	5.5 LT	5.5 L1 4 LT	5.5 L1 4 LT	5.5 LT	5.5 LT	3.5 L1 4 LT	3.5
Benzyi Alconoi Dithiane	3.3 LT	3.3 LT	3.3 LT	3.3 LT	3.3 LT	3.3 LT	3.3
Hexachloroethane	8.3 LT	8.3 LT	8.3 LT	8.3 LT	8.3 LT	8.3 LT	8.3
Dibromochloropropane	12 LT	12					
Isophorone	2.4 LT	2.4 LT	2.4 LT	2.4 LT	2.4 LT	2.4 LT	2.4
Bis (2-Chloroethoxy) Methane	6.8 LT	6.8 LT	6.8 LT	6.8 LT	6.8 LT	6.8 LT	6.8
Benzoic Acid	3.1 ND	3.1 ND	3.1 ND	3.1 ND	3.1 ND	3.1 ND	3.1
4-Chloroaniline	1 ND	1 1					
Hexachlorocyclopentadiene	54 LT	54					
2-Nitroaniline	31 ND						
3-Nitroaniline	15 LT	15					
Dibenzofuran	5.1 LT	5.1 LT	5.1 LT	5.1 LT	5.1 LT	5.1 LT	5.1
4-Chlorophenylphenyl Ether	23 LT	23					
4-Nitroaniline	31 ND	31 13					
1,2-Diphenylhydrazine	13 LT	13 LT	13 LT	13 LT 8.8 LT	13 LT	13 LT 8.8 LT	
2,6-Dinitroaniline	8.8 LT	8.8 LT	8.8 LT		8.8 LT		
4-Bromophenylphenyl Ether 3,5-Dinitroaniline	22 LT 21 LT	22 LT 21 LT	22 LT 21 LT	22 LT 21 LT	22 LT 21 LT	22 LT 21 LT	22 21
3,5-Dinitroaniine Hexachlorobutadiene	8.7 LT	8.7 LT	8.7 LT	8.7 LT	8.7 LT	8.7 LT	8.7
nexachlorobutadiene 3,3'-Dichlorobenzidine	8.7 LT	8.7 LT	8.7 L1 5 LT	5 LT	8.7 LT	8.7 LT	5.7
of State and Cook Evan to]	"	5 2.	0 2.	0 L.		
	0	١ ٥	0	0	4	1 0	8
TOTAL SVOC			77 Lab (21	24 Lob 02	24-566 02	77. Ech (P)	10 3 40 / 193
TOTAL SVOC Collection Date: Extraction Date:	23-Feb-93 27-Mar-93	23-Feb-93 02-Mar-93	23-Feb-93 02-Mar-93	24-Feb-93 02-Mar-93	24-Feb-93 25-Mar-93	23-Feb-93 27-Feb-93	18-Mar-93 25-Mar-93

TES:

1) += Depth based on total depth measurements assuming a 10-ft screen and a 2-ft stickup (no well log available)

(2) LT= Less than detection limits; ND= Not detected

TABLE DSY-4: Semivolatile Organic Compounds in Ground Water from the DSY Fort George G. Meade, Maryland

Fort George G. Meade, Maryland		
Page 3 of 4 Sample Location Identification	93QC-153	93OC-253
Field Sample ID	Q1XF153Y	Q1XF253Y
Site Type	FBLK	FBLK
Screen Start Depth (ft bgs)	-	
Screen End Depth (ft bgs) Media	CSW	CSW
Total/Dissolved	Total	Total
QC Type	Field Blank	Rinse Water
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)		
CHLORINATED MONOCYCLIC AROMATICS		
1,3-Dichlorobenzene	3.4 LI	3.4 LT
1,4-Dichlorobenzene	1.5 LT	1.5 LT
1,2-Dichlorobenzene	1.2 LT 2.4 LT	1.2 LT 2.4 LT
1,2,4-Trichlorobenzene 1,2,3-Trichlorobenzene	5.8 LT	5.8 LT
Hexachlorobenzene	12 LT	12 LT
NITROSAMINES		
N-Nitroso Dimethylamine	9.7 LI	9.7 LT
N-Nitroso Di-N-Propylamine	6.8 LT	6.8 LT 3.7 LT
N-Nitroso Diphenylamine	3.7 LT	3.7 L1
NITROMONOCYCLIC AROMATICS	7711	3.7 LT
Nitrobenzene 3-Nitrotoluene	3.7 LT 2.9 LT	2.9 LT
3-Nitrotoluene 2,6-Dinitrotoluene	6.7 LT	6.7 LT
2,4-Dinitrotoluene	5.8 LT	5.8 LT
PHOSPHORUS CONTAINING		
Dimethylmethyl Phosphate	130 LT	130 LT
Diisopropylmethyl Phosphonate	21 LT	21 LT
PCBs		
PCB 1016	9.1 ND	9.1 ND
PCB 1221	7.2 ND	7.2 ND
PCB 1232 PCB 1242	9.9 ND 5.2 ND	9.9 ND 5.2 ND
PCB 1248	38 ND	38 ND
PCB 1254	33 ND	33 ND
PCB 1260	13 ND	13 ND
PHENOLS		
Phenol	2.2 LT	2.2 LT 2.8 LT
4-Methylphenol	2.8 LT 2.8 LT	2.8 LT
2-Chlorophenol 2-Methylphenol	3.6 LT	3.6 LT
2-Nitrophenol	8.2 LT	8.2 LT
2,4-Dimethylphenol	4.4 LT	4.4 LT
2,4-Dichlorophenol	8.4 LT	8.4 LT 8.5 LT
3-Methyl-4-Chlorophenol	8.5 LT 3.6 LT	8.5 LT 3.6 LT
2,4,6-Trichlorophenol 2,4,5-Trichlorophenol	2.8 LT	2.8 LT
2.3.6-Trichlorophenol	1.7 LT	1.7 LT
2,4-Dinitrophenol	180 LT	180 LT
4-Nitrophenol	96 LT	96 LT
Methyl-4,6-Dinitrophenol Pentachlorophenol	50 ND 9.1 LT	50 ND 9.1 LT
	J.1 E1	5 2.
POLYNUCLEAR AROMATICS Naphthalene	0.5 LT	0.5 LT
2-Methylnaphthalene	1.3 LT	1.3 LT
2-Chloronaphthalene	2.6 LT	2.6 LT
Acenaphthene	5.8 LT	5.8 LT
Fluorene Phenanthrene	9.2 LT 9.9 LT	9.2 LT 9.9 LT
Anthracene	5.9 LT	5.2 LT
Pyrene	17 LT	17 LT
Fluoranthene	24 LT	24 LT
Benzo [A] Anthracene	9.8 ND	9.8 ND
Chrysene (D) Chromathana	7.4 LT 10 LT	7.4 LT 10 LT
Benzo [B] Fluoranthene Benzo [K] Fluoranthene	10 LT	10 LT
Benzo A Pyrene	14 LT	14 LT
Indeno [1,2,3-C,D] Pyrene	21 LT	21 LT
Dibenz [A,H] Anthracene	12 LT	12 LT
Benzo [G,H,I] Perylene	15 LT	15 LT

TABLE DSY-4: Semivolatile Organic Compounds in Ground Water from the DSY Fort George G. Meade, Maryland

ge 4 of 4		
mple Location Identification	93QC-153	93QC-253
Field Sample ID	Q1XF153Y	Q1XF253Y
Site Type Screen Start Depth (ft bgs)	FBLK	FBLK
Screen End Depth (it bgs)		
Media	CSW	CSW
Total/Dissolved	Total	Total
QC Type	Field Blank	Rinse Water
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)		
PESTICIDES		
Beta-Hexachlorocyclohexane	17 LI	17 LT
Alpha-Hexachlorocyclohexane	5.3 LT	5.3 LT
Atrazine	5.9 LT 7.2 LT	5.9 LT 7.2 LT
Lindane Delta Hayachiana (debayana	3 ND	3 ND
Delta-Hexachlorocyclohexane Heptachlor	38 LT	38 LT
Bromacii	2.9 LT	2.9 LT
Malathion	21 LT	21 LT
2,2-Bis (Para-Chlorophenyl)-1,1,1-Trichloroethane	14 LT	14 LT
Parathion Aldrin	37 LT 13 LT	37 LT 13 LT
Supona	19 LT	19 LT
Isodrin	7.8 LT	7.8 LT
Heptachlor Epoxide	28 LT	28 LT
Vapona	8.5 LT	8.5 LT
Chlordane Alpha-Endosulfan / Endosulfan I	37 ND 23 LT	37 ND 23 LT
2,2-Bis (Para-Chlorophenyl)-1,1-Dichloroethene	18 LT	18 LT
Dieldrin	26 LT	26 LT
Endrin Aldehyde	5 LT	5 LT
Endrin	18 LT	18 LT
2,2-Bis (Para-Chlorophenyl)-1,1-Dichloroethane	18 LT	18 LT
Beta-Endosulfan / Endosulfan II Endosulfan Sulfate	42 LT 50 LT	42 LT 50 LT
Methoxychlor	11 LT	11 LT
Mirex	24 LT	24 LT
Endrin Ketone	6 ND	6 ND
Toxaphene	17 ND	17 ND
PHTHALATES		
methyl Phihalate	22 LT	22 LT
ethyl Phthalate	5.9 LT	5.9 LT
Di-N-Butyl Phthalate	33 LT	33 LT
Butylbenzyl Phthalate	28 LT	28 LT
Bis (2-Ethylhexyl) Phthalate	7.7 LT	7.7 LT
Di-N-Octyl Phthalate	1.5 LT	1.5 LT
SULFUR CONTAINING ORGANICS		
4-Chlorophenylmethyl Sulfoxide	10 LT	10 LT
4-Chlorophenylmethyl Sulfide	15 LT	15 LT
4-Chlorophenylmethyl Sulfone	5.3 LT	5.3 LT
OTHER		
1.4-Oxathiane	27 LT	27 LT
Bis (2-Chloroisopropyl) Ether	5 LT	5 LT
Bis (2-Chloroethyl) Ether	0.68 LT	0.68 LT
Dicyclopentadiene	5.5 LT	5.5 LT
Benzyl Alcohol Dithiane	4 LT 3.3 LT	4 LT 3.3 LT
Hexachloroethane	8.3 LT	8.3 LT
Dibromochloropropane	12 LT	12 LT
Isophorone	2.4 LT	2.4 LT
Bis (2-Chloroethoxy) Methane	6.8 LT	6.8 LT
Benzoic Acid 4-Chloroaniline	3.1 ND	3.1 ND
4-Chloroaniine Hexachlorocyclopentadiene	1 ND 54 LT	1 ND 54 LT
2-Nitroaniline	31 ND	31 ND
3-Nitroaniline	15 LT	15 LT
Dibenzofuran	5.1 LT	5.1 LT
4-Chlorophenylphenyl Ether	23 LT	23 LT
4-Nitroaniline 1,2-Diphenylhydrazine	31 ND	31 ND
1,2-Dipnerry:nydrazine 2,6-Dinitroaniline	13 LT 8.8 LT	13 LT 8.8 LT
4-Bromophenylphenyl Ether	22 LT	22 LT
3,5-Dinitroaniline	21 LT	21 LT
Hexachlorobutadiene	8.7 LT	8.7 LT
3,3'-Dichlorobenzidine	5 LT	5 LT
TOTAL SUCC	,	_
TOTAL SVOC Collection Date:	0 23-Feb-93	0 23-Feb-93
Extraction Date:	12-Mar-93	12-Mar-93
alysis Date:	21-Mar-93	21-Mar-93
ES:		

T1+= Depth based on total depth measurements assuming a 10-ft screen and a 2-ft stickup (no well log available)
(2) LT= Less than detection limits; ND= Not detected

Appendix I: Fire Training Area Analytical Results

Table FTA-1: Field Screening, Metals and Petroleum Hydrocarbon Data for Ground Water from the FTA

Table FTA-2: Volatile Organic Compounds in Ground Water from the FTA

Table FTA-3: Semivolatile Organic Compounds in Ground Water from the FTA

Table FTA-4: Volatile Organic Compounds and Petroleum Hydrocarbons Data for Fort George G. Meade, Maryland

Table FTA-5: Semivolatile Organic Compounds in Sediment from the Fire Training Area

Note: The term "LT" indicates that a certified analyte is not detected. The term "ND" is used for analytes that are added to certified methods but have not gone through the certification process. The term "LT" is followed by the certified reporting limit, it does not signify that a compound was actually detected but not included because results were below the Contract Required Detection Limit.

TABLE FTA-1: Field Screening, Metals and Petroleum Hydrocarbon Data for Ground Water from the FTA ort George G. Meade, Maryland

Page 1 of 2

Sample Location Identification Field Sample ID Site Type Screen Start Depth (ft bgs) Screen End Depth (ft bgs) Media Total/Dissolved OC Type	FTAMW-1	FTAMW-1	FTAMW-2	FTAMW-2	FTAMW-3	FTAMW-3
	F1M0001Y	F1M0001Z	F1M0002Y	F1M0002Z	F1M0003Y	F1M0003Z
	WELL	WELL	WELL	WELL	WELL	WELL
	3.5	3.5	3.6	3.6	3.6	3.6
	13.5	13.5	13.6	13.6	13.6	13.6
	CGW	CGW	CGW	CGW	CGW	CGW
	Total	Dissolved	Total	Dissolved	Total	Dissolved
pH Conductivity (umhos/cm2) Temperature (C) Turbidity (NTU)	7.43 0.127 7.3 8		5.59 0.1 8.8 140		5.06 0.111 6.3 >999	
METALS (ug/L) Aluminum Antimony Arsenic Barium Beryllium Boron Cadmium Calcium Chromium Cobalt Copper Iron Lead Magnesium anganese broury Molybdenum Nickel Potassium Selenium Silver Sodium	1320 60 LT 2.35 LT 44.5 1.12 LT 230 LT 6.78 LT 14200 16.8 LT 25 LT 18.8 LT 2820 4.47 LT 4290 94.7 0.1 LT 52.7 LT 32.1 LT 1740 2.53 LT 10 LT 2380	112 LT 60 LT 235 LT 24.6 1.12 LT 230 LT 6.78 LT 13800 16.8 LT 77.5 LT 4.47 LT 3750 67.5 0.1 LT 52.7 LT 32.1 LT 1780 2.53 LT 1780 2.53 LT 1780 2.53 LT 1780 2.53 LT 1780 2.53 LT 1780 2.53 LT 1780 2.53 LT	7460 60 LT 2.35 LT 65.6 1.12 LT 230 LT 6.78 LT 14600 23.1 25 LT 18.8 LT 15200 10.2 3810 10.2 3810 155 0.1 LT 52.7 LT 32.1 LT 3570 253 LT 10 LT 3150	112 LT 60 LT 2.35 LT 18.7 1.12 LT 230 LT 6.78 LT 12400 16.8 LT 28.8 18.8 LT 77.5 LT 1960 35.9 0.1 LT 52.7 LT 32.1 LT 2740 2.53 LT 10 LT 2820	23700 61.5 5.82 178 2.35 230 LT 6.78 LT 14100 57.9 37 31.3 44400 24.4 8060 637 0.1 52.7 LT 32.1 LT 5130 2.53 LT 10 LT 2920	112 LT 60 LT 2.35 LT 46.9 1.12 LT 230 LT 6.78 LT 12800 16.8 LT 31.9 18.8 LT 115 4.47 LT 3460 327 0.1 LT 52.7 LT 1710 2.53 LT 1710 2.53 LT 10 LT 2980
Tellurium Thallium Tin Vanadium Zinc	118 LT	118 LT	118 LT	118 LT	118 LT	118 LT
	125 LT	125 LT	125 LT	125 LT	125 LT	125 LT
	59.9 LT	59.9 LT	59.9 LT	59.9 LT	59.9 LT	59.9 LT
	27.6 LT	27.6 LT	27.6 LT	27.6 LT	101	27.6 LT
	18 LT	18 LT	34.8	18 LT	76.2	18 LT
HEAVY METALS(1) GRAND TOTAL METALS TOTAL PETROLEUM HYDROCARBONS	0 26889	0 21742	33.3 48079	20003	10509.4 99523	0 21471
Diesel Fuel (mg/L) Collection Date:	0.1 LT	NA	0.1 LT	NA	0.1 LT	NA
	18-Feb-93	18-Feb-93	18-Feb-93	18-Feb-93	18-Feb-93	18-Feb-93

NOTES:
(1) = Heavy metals include Sb,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag; LT= Less than detection limits; ND= Not detected J = Value is estimated
(2) NA = Not Analyzed

TABLE FTA-1: Field Screening, Metals and Petroleum Hydrocarbon Data for Ground Water from the FTA Fort George G. Meade, Maryland Page 2 of 2

		0000 050
Sample Location Identification	93QC-152	93QC-252
Field Sample ID	Q1XF152Y	Q1XF152Y
Site Type	FBLK	RNSW
Screen Start Depth (ft bgs)	-	-
Screen End Depth (ft bgs)		-
Media	CSW	CSW
Total/Dissolved	Total	Total
, -,	Field Blank	Rinse Water
QC Type	Fleid Blank	milise vvalei
FIELD PARAMETERS		
pH		
Conductivity (umhos/cm2)		
Tomographys (C)		
Temperature (C)		
Turbidity (NTU)		
METALS (ug/L)		
Aluminum	112 LT	112 LT
Antimony	60 LT	60 LT
Arsenic	2.35 LT	2.35 LT
	2.82 LT(J)	2.82 LT
Barium		1.12 LT
Beryllium	1.12 LT	230 LT
Boron	230 LT	
Cadmium	6.78 LT	6.78 LT
Calcium	105 LT	105 LT
Chromium	16.8 LT	16.8 LT
Cobalt	25 LT	25 LT
Copper	18.8 LT	18.8 LT
Iron	77.5 LT	77.5 LT
Lead	4.47 LT	4.47 LT
Magnesium ·	135 LT	135 LT
	9.67 LT	9.67 LT
Manganese	9.67 LT	0.1 LT
Mercury	52.7 LT	52.7 LT
Molybdenum		
Nickel	32.1 LT	32.1 LT
Potassium	1240 LT	1240 LT 2.53 LT
Selenium	2.53 LT	
Silver	10 LT	10 LT
Sodium	279 LT	279 LT
Tellurium	118 LT	118 LT
Thallium	125 LT	125 LT
Tin	59.9 LT	59.9 LT
Vanadium	27.6 LT	27.6 LT
Zinc	18 LT	18 LT
HEAVY METALS(1)	0	0
GRAND TOTAL METALS	0	0
TOTAL PETROLEUM HYDROCARBONS		
IOTAL PETROLEUM HTDROCARBONS		
Diesel Fuel (mg/L)	NA	NA NA
Collection Date:	18-Feb-93	18-Feb-93
NOTES:		

NOTES:
(1) = Heavy metals include Sb,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag; LT= Less than detection limits; ND= Not detected J = Value is estimated
(2) NA = Not Analyzed

TABLE FTA-2: Volatile Organic Compounds in Ground Water from the FTA ort George G. Meade, Maryland Page 1 of 1

Page 1 of 1 Sample Location Identification	FTAMW-1		FTAMW-2		FTAMW-3	93QC-152	93QC-252
Field Sample ID	F1M0001Y		F1M0002Y		F1M0003Y	Q1XF152Y	Q1XR252Y
Site Type	WELL		WELL		WELL	FBLK	RNSW
Screen Start Depth (ft bags) Screen End Depth (ft bags)	3.5		3.6		3.6 13.6	-	-
Media	13.5 CGW		13.6 CGW		CGW	csw	csw
QC Type	CGW		CGW		CGW	Field Blank	Rinse Water
VOLATILE ORGANIC COMPOUNDS (ug/L)			L		· .	T TOTO DIGITAL	Transcription
AROMATICS							
Benzene	1	LT	1	LT	1 LT	1 1	.T 1 L
Toluene	1 1	LŢ	1	ĻŢ	1 17	1 !	1 1 1
Ethylbenzene Xylenes	1 2	LT LT	1 2	LT LT	1 LT 2 LT		.T 1 L .T 2 L
1,3-Dichlorobenzene	1 1	ĽŤ	ĺí	ĽŤ	ו וֹ נֹדֹ	1 1	וֹ וֹנוֹ
Styrene	5	ND	5	ND	5 NC		
CHLORINATED AROMATICS							
Chlorobenzene	1	LT	1	LT	1 LT	1 [
1,3-Dimethylbenzene / M-Xylene	1	ĻŢ	1	LŢ	1 17		<u>. I</u> 1 i
Dichlorobenzene, Nonspecific	2	LT	2	LT	2 LT	2 1	.T 2 L
HALOGENATED ORGANICS							
Chloromethane	1.2	LT	1.2	LT	1.2 LT	1.2	T 1.2 L
Bromomethane	14	LT	14	LT	14 LT	14 L	.T 14 L
Chloroethene / Vinyl Chloride	12	LT	12	LT	12 LT		T 12 L
Chloroethane	8	LT	8	LT	8 LT		T 8 L
Methylene Chloride	1 1	ĻŢ	!	LŢ	1 LT		I 1 1
1,1-Dichloroethylene / 1,1-Dichloroethene 1,1-Dichloroethane	1 1	LT	1		1 LT 1 LT		
1,2-Dichloroethylenes (Cis And Trans Isomers)	5	LT	5	LT	5 LT		T 5 L
Chloroform	1 1	ĽΤ	Ĭ	נד	i LT	1 11	H it
2-Dichloroethane	1 1	LT	i	LT	i LT		i i i
1,1-Trichloroethane	1 1	LT	i	LT	1 LT	1 L	T 1 L
Carbon Tetrachloride	1	LT	1	LT	35	1 L	.T] 1 L
Bromodichloromethane	1 1	LŢ	1	LT	1 LT	1 L	<u> </u>
1,2-Dichloropropane	1 !	ΙŢ	!	LŢ	1 LT		T 5.1
Trichloroethylene / Trichloroethene 1,3-Dichloropropane	4.8	LT	1 4.8	LT	1 LT 4.8 LT	1 L 4.8 L	T] 1 L TI 4.8 L
Dibromochloromethane	1 1	납	4.0	ĹŤ	4.8 LT		לו יוֹן בּיוֹן
1,1,2-Trichloroethane	1 i	LT	i	LT	1 LT		i i i
2-Chloroethylvinyl Ether / (2-Chloroethoxy) Ethene	3.5	LT		ĹΤ	3.5 LT		T 3.5 L
Bromoform	11	LT	11	LT	11 LT	11 L	
1,1,2,2-Tetrachloroethane	1.5	LŢ	1.5	LI	1.5 LT	1.5 L	
Tetrachloroethylene / Tetrachloroethene Carbon Disulfide	1 1	LT	1	LT	1 LT	1 L	
Cis-1,3-Dichloropropylene / Cis-1,3-Dichloropropene	5 5	ND ND	5 5	ND ND	5 ND 5 ND		
Trans-1,3-Dichloropropene	5	ND	5	ND	5 ND		
WATER SOLUBLE							
Acetone		LT		LT	8 LT	8 L	1 8 L
Methylethyl Ketone / 2-Butanone		LŢ	10	LI	10 LT	10 L	
Methylisobutyl Ketone/4-Methyl-2-Pentanone Methyl-N-Butyl Ketone / 2-Hexanone	1.4	ND	1.4	ND	1.4 LT 1 ND		
OTHER			·		. 110		1 "
Acrylonitrile	8.4	17	8.4	┰┯┦	8.4 LT	8.4 L	1 8.4 L
Trichlorofluoromethane		낽	1	낽	1 LT	1 1	
Acetic Acid, Vinyl Ester / Vinyl Acetate		ND		ND	1 ND		
TOTAL VOCs	0		0		35	0	5
Collection Date:	18-Feb-93		18-Feb-93		18-Feb-93	18-Feb-93	18-Feb-93
Extraction Date:	04-Mar-93	ı	04-Mar-93		04-Mar-93	04-Mar-93	04-Mar-93
Analysis Date: Notes:	04-Mar-93		04-Mar-93		04-Mar-93	04-Mar-93	04-Mar-93

Notes: (1) ND = Not detected; LT = less than detection limit

TABLE FTA-3: Semivolatile Organic Compounds in Ground Water from the FTA Fort George G. Meade, Maryland Page 1 of 2

Sample Location ID Field Sample ID Site Type	FTAMW-1 FIM0001Y WELL	FTAMW-2 FIM0002Y WELL	FTAMW-3 FIM0003Y WELL	93QC-152 Z1XF152Y FBLK	93QC-252 Q1XR252Y RNSW
Screen Start Depth (ft bgs) Screen End Depth (ft bgs) Media	3.5 13.5 CGW	3.6 13.6 CGW	3.6 13.6 CGW	CSW	CSW rinse water
QC Type Semivolatile Organic Compounds (ug/g)				field blank	THISE WALET
Chlorinated Monocyclic Arormatics	24 14	3.4 LT	3.4 LT	3,4 LT	3.4 LT
1,3-Dichlorobenzene 1,4-Dichlorobenzene 1,2-Dichlorobenzene	3.4 LT 1.5 LT 1.2 LT	1.5 LT 1.2 LT	1.5 LT 1.2 LT	1.5 LT 1.2 LT 2.4 LT	1.5 LT 1.2 LT 2.4 LT
1,2,4-Trichlorobenzene 1,2,3-Trichlorobenzene Hexachlorobenzene	2.4 LT 5.8 LT 12 LT	2.4 LT 5.8 LT 12 LT	2.4 LT 5.8 LT 12 LT	5.8 LT 12 LT	5.8 LT 12 LT
Nitromonocyclic Aromatics Nitrobenzene	3.7 LT	3.7 LT	3.7 LI	3.7 L1	3.7 LI
3-Nitrotoluene 2,6-Dinitrotoluene 2,4-Dinitrotoluene	2.9 LT 6.7 LT 5.8 LT	2.9 LT 6.7 LT 5.8 LT	2.9 LT 6.7 LT 5.8 LT	2.9 LT 6.7 LT 5.8 LT	2.9 LT 6.7 LT 5.8 LT
Nitrosamines N-Nitroso Dimethylamine	9.7 LT				
N-Nitroso Dinetriyatriine N-Nitroso Di-N-Propylamine N-Nitroso Diphenylamine	6.8 LT 3.7 LT				
Phenols Phenol	2.2 LT	22 LT	2.2 LT	2.2 LT	22 LT
2-Chiorophenol 2-Methylphenol / 2-Cresol 4-Methylphenol / 4-Cresol	2.8 LT 3.6 LT 2.8 LT	2.8 LT 3.6 LT 2.8 LT 8.2 LT	2.8 LT 3.6 LT 2.8 LT 8.2 LT	2.8 LT 3.6 LT 2.8 LT 8.2 LT	2.8 LT 3.6 LT 2.8 LT 8.2 LT
2-Nitrophenol 2,4-Dimethylphenol 2,4-Dichlorophenol 4-Chloro-3-Cresol / 3-Methyl-4-Chlorophenol	8.2 LT 4.4 LT 8.4 LT 8.5 LT	4.4 LT 8.4 LT 8.5 LT	4.4 LT 8.4 LT 8.5 LT	4.4 LT 8.4 LT 8.5 LT	4.4 LT 8.4 LT 8.5 LT
2.4,6-Trichlorophenol 2.3,6-Trichlorophenol	3.6 LT 2.8 LT 1.7 LT	3.6 LT 2.8 LT 1.7 LT	3.6 LT 2.8 LT 1.7 LT	3.6 LT 2.8 LT 1.7 LT	3.6 LT 2.8 LT 1.7 LT
2,4-Dinitrophenol 4-Nitrophenol	180 LT 96 LT 50 ND	180 LT 96 LT 50 ND	180 LT 96 LT 50 ND	180 LT 96 LT 50 ND	180 LT 96 LT 50 ND
4,6-Dinitro-2-Cresol / Methyl-4,6-Dinitrophenol Penlachlorophenol	9.1 LT				
PNAs Naphthalene	0.5 LT				
2-Methylnaphthalene 2-Chloronaphthalene	1.3 LT 2.6 LT 5.1 LT	1.3 LT 2.6 LT 5.1 LT	1.3 LT 2.6 LT 5.1 LT	1.3 LT 2.6 LT 5.1 LT	1.3 LT 2.6 LT 5.1 LT
Acenaphthylene Acenaphthene Fluorene	5.8 LT 9.2 LT 9.9 LT	5.8 LT 9.2 LT 9.9 LT	5.8 LT 9.2 LT 9.9 LT	5.8 LT 9.2 LT 9.9 LT	5.8 LT 9.2 LT 9.9 LT
Phenanthrene Anthracene Fluoranthene	5.2 LT 24 LT				
Pyrene Benzo [A] Anthracene	17 LT 9.8 LT 7.4 LT	17 LT 9.8 LT 7.4 LT	17 LT 9.8 LT 7.4 LT	17 LT 9.8 LT 7.4 LT	17 LT 9.8 LT 7.4 LT
Griyserie Benzo [B] Fluoranthene Benzo [K] Fluoranthene	10 LT 10 LT	10 LT 10 LT	10 LT 10 LT	10 LT 10 LT 14 LT	10 LT 10 LT 14 LT
Benzo [A] Pyrene Indeno [1,2,3-C,D] Pyrene Dibenzo [A,H] Anthracene	14 LT 21 LT 12 LT 15 LT	14 LT 21 LT 12 LT 15 LT	14 LT 21 LT 12 LT 15 LT	21 LT 12 LT 15 LT	21 LT 12 LT 15 LT
Benzo [G,H,I] Perylene	10 21	10 21	, , ,		
PcBs Pcb 1016 Pcb 1221	9.1 ND 7.2 ND		9.1 ND 7.2 ND	9.1 ND 7.2 ND	9.1 ND 7.2 ND
Pdb 1232 Pdb 1242	9.9 ND 5.2 ND				
Pdb 1248 Pdb 1254	38 ND 33 ND 13 ND	33 ND	38 ND 33 ND 13 ND	38 ND 33 ND 13 ND	38 ND 33 ND 13 ND
Pcb 1260 Collection Date: Extraction Date:	18-Feb-93 24-Feb-93	18-Feb-93 24-Feb-93	18-Feb-93 24-Feb-93	18-Feb-93 24-Feb-93 04-Mar-93	18-Feb-93 24-Feb-93 04-Mar-93
Analysis Date:	04-Mar-93	04-Mar-93	04-Mar-93	04-Mar-93	04-IVIAI-93

BLE FTA-3: Semivolatile Organic Compounds in Ground Water from the FTA in George G. Meade, Maryland Page 2 of 2

Sample Location ID Field Sample ID Site Type Screen Start Depth (ft bgs)	FTAMW-1 FIM0001Y WELL 3.5	FTAMW-2 FIM0002Y WELL 3.6	FTAMW-3 FIM0003Y WELL 3.6	93QC-152 Z1XF152Y FBLK -	93QC-252 Q1XR252Y RNSW -
Screen End Depth (ft bgs) Media	13.5 CGW	13.6 CGW	13.6 CGW	CSW	CSW
QC Type				field blank	rinse water
Phosphorus Containing Dimethylmethyl Phosphate	130 LT 21 LT	130 LT 21 LT	130 LT 21 LT	130 LI 21 LT	130 LI 21 LT
Diisopropylmethyl Phosphonate	21 LI	21 LI	21 Li	21 LI	21 L1
Pesticides Apna-Benzenenexachioride / Aipna-Hexachiorocydonexane	5.3 LI	5.3 LI	5.3 LI	5.3 LT	5.3 LI
Beta-Benzenehexachloride / Beta-Hexachlorocyclohexane Atrazine	17 LT 5.9 LT	17 LT 5.9 LT	17 LT 5.9 LT	17 LT 5.9 LT	17 LT 5.9 LT
Lindane / Gama-Benzenehexachloride / Gamma-Hexachlorocyclohexane Delta-Benzenehexachloride / Delta-Hexachlorocyclohexane Heptachlor	7.2 LT 3 ND 38 LT	7.2 LT 3 ND 38 LT	7.2 LT 3 ND 38 LT	7.2 LT 3 ND 38 LT	7.2 LT 3 ND 38 LT
Bromacil Malathion	2.9 LT	29 IT	29 IT	29 IT	l 2.9 LT
Parathion	21 LT 37 LT 13 LT	21 LT 37 LT 13 LT	21 LT 37 LT 13 LT	21 LT 37 LT 13 LT	21 LT 37 LT 13 LT
Aldrin Supona / 2-Chloro-1-(2,4-Dichlorophenyl) Vinyl Diethyl Phosphate	19 LT 7.8 LT	19 LT	19 LT 7.8 LT	19 LT 7.8 LT	19 LT 7.8 LT
Isodrin Heptachlor Epoxide Chlordane	28 LT	28 LT	28 LT 1	28 LT	28 LT
Chlordane Vapona	8.5 LT	8.5 LT	8.5 LT	8.5 LT i	8.5 LT
Alpha-Endosulfan / Endosulfan I 2,2-Bis (Para-Chlorophenyl)-1,1-Dichloroethene	23 LT 14 LT	23 LT 14 LT	23 LT 14 LT	23 LT 14 LT	23 LT 14 LT
Dieldrin Endrin Aldehyde	26 LT	26 LT	26 LT	26 LT 5 LT 18 LT	26 LT
Endrin	5 LT 18 LT 18 LT	5 LT 18 LT 18 LT	5 LT 18 LT 18 LT	18 LT	5 LT 18 LT 18 LT
2,2-Bis (Para-Chlorophenyl)-1,1-Dichloroethane Beta-Endosulfan / Endosulfan Ii	18 LT 42 LT 18 LT	42 LT	42 LT	42 LT	42 LT 18 LT
2,2-Bis (Para-Chlorophenyl)-1,1,1-Trichloroethane Endosulfan Sulfate	50 LT 11 LT	18 LT 50 LT 11 LT	50 LT	18 LT 50 LT 11 LT	50 LT
Methoxychlor Mirex	24 IT	24 IT	24 LT	24 LT	24 LT
Endrin Ketone Toxaphene	6 ND 17 ND	6 ND 17 ND	6 ND 17 ND	6 ND 17 ND	6 ND 17 ND
thalates					
Jimethyi Phihalate	2.2 LT 5.9 LT	22 LT 5.9 LT	2.2 LT 5.9 LT	2.2 LT 5.9 LT	2.2 LT 5.9 LT
Diethyl Phthalate Di-N-Butyl Phthalate	33 LT 28 LT	33 LT 28 LT	33 LT 28 LT	33 LT 28 LT	33 LT 28 LT
Butylben'zyl Phthalate Bis (2-Ethylhexyl) Phthalate	7.7 LT	7.7 LT	7.7 LT	7.7 LT	7.7 LT
Di-N-Octyl Phthalate	1.5 LT	1.5 LT	1.5 LT	1.5 LT	1.5 LT
Sulfur Contaning Organics 4-Chlorophenylmetriyi Sulfide	IO LT	IO LT	10 LT	IO LT	10 LT
4-Chlorophenylmethyl Sulfoxide 4-Chlorophenylmethyl Sulfone	15 LT 5.3 LT	15 LT 5.3 LT	15 LT 5,3 LT	15 LT 5.3 LT	15 LT 5.3 LT
	5.5 2.	5.5 2.	5.5 2.	0.0 2,	1
Other 1.4-Oxathiane	2/ L1 0.68 LT	27 LT 0.68 LT	2/ L1 0.68 LT	27 LT 0.68 LT	2/ LT 0.68 LT
Bis (2-Chloroethyl) Ether Dicyclopentadiene	5.5 LT	5.5 LT	5.5 LT	5.5 LT	5.5 LT
Benzyl Alcohol Bis (2-Chloroisopropyl) Ether	4 LT 5 LT	4 LT 5 LT	4 LT 5 LT	4 LT	4 LT 5 LT
Dithiane Hexachloroethane	3.3 LT	3.3 LT	3.3 LT 8.3 LT	3.3 LT 8.3 LT	3.3 LT 8.3 LT
Dibromochioropropane	8.3 LT 12 LT	8.3 LT 12 LT 2.4 LT	8.3 LT 12 LT 2.4 LT	12 Li j	8.3 LT 12 LT 24 LT
Isophorone Bis (2-Chloroethoxy) Methane	2.4 LT 6.8 LT	6.8 LT	6.8 LT	2.4 LT 6.8 LT	2.4 LT 6.8 LT
Benzoic Acid 4-Chloroaniline	3.1 ND 1 ND 54 LT	3.1 ND 1 ND 54 LT	3.1 ND 1 ND 54 LT	3.1 ND 1 ND 54 LT	3.1 ND 1 ND 54 LT
Hexachiorocyclopentadiene 2-Nitroaniline	31 ND	31 ND	31 ND	31 ND	31 ND
3-Nitroaniline Dibenzoluran	15 LT 5.1 LT	15 LT 5.1 LT	15 LT 5.1 LT	15 LT 5.1 LT	15 LT 5.1 LT
4-Chlorophenylphenyl Ether	23 LT 31 ND 13 LT	23 LT	23 LT	23 LT I	23 LT
4-Nitroaniline 1,2-Diphenylhydrazine	13 LT	31 ND 13 LT	31 ND 13 LT	13 LT I	31 ND 13 LT
2,6-Dinitroaniline 4-Bromophenylphenyl Ether	8.8 LT 22 LT 21 LT	8.8 LT 22 LT	8.8 LT 22 LT	8.8 LT 22 LT 21 LT	8.8 LT 22 LT
3,5-Dinitroaniline Hexachlorobutadiene	21 LT 8.7 LT	21 LT 8.7 LT 5 LT	21 LT 8.7 LT 5 LT	21 LT 8.7 LT 5 LT	21 LT 8.7 LT 5 LT
Hexachlorobutadiene 3,3-Dichlorobenizidine Collection Date:	8.7 LT 5 LT 18-Fe0-93	8.7 LT 5 LT 18-Feb-93	5 LT 18-F90-93	5 LT 18-Feb-93	5 LT 18-Feb-93
Extraction Date:	24-Feb-93 04-Mar-93	24-Feb-93 04-Mar-93	24-Feb-93 04-Mar-93	24-Feb-93 04-Mar-93	24-Feb-93 04-Mar-93

TABLE FTA-4: Volatile Organic Compounds and Petroleum Hydrocarbons Data for Fort George G. Meade, Maryland Page 1 of 1

Size D		
Site Type SUMP O	Site ID	
Site Type SUMP Start Depth (ft) End Depth (ft) 0.5	Field Sample ID	F1D0001A
Start Depth (ft)		SUMP
End Depth (ft) Media CSE		0
Macida CSE	Sizit Depth (II)	
VOLATILE ORGANIC COMPOUNDS (ug/g) AROMATICS		
VOLATILE ORGANIC COMPOUNDS (ug/g) AROMATICS Benzene 1.4	Media	CSE
VOLATILE ORGANIC COMPOUNDS (ug/g) AROMATICS Benzene 1.4	QC Type	
AROMATICS Benzene Toluene 4.7 7 7 7 7 7 7 7 7 7		
AROMATICS Benzene Toluene 4.7 7 7 7 7 7 7 7 7 7	VOLATILE OPCANIC COMPOLINDS (ug/g)	
Benzene 10.57 1.4 4.7 4.7 Ethylbenzene 1.4 4.3 4.3 4.8 8 5.5	TODATILE ORGANIC COMPOCIADO (US/S)	
Benzene 10.57 1.4 4.7 4.7 Ethylbenzene 1.4 4.3 4.3 4.8 8 5.5	ADOLLAMOS	
Toluene	AROMATICS	
Ethylbenzene	Benzene	
March Marc	Toluene	4.7
March Marc	Ethylhenzene	1.4
Xylenes Styrene		***
Syrene		
CHLORINATED AROMATICS Chlorobenzene 1,3-Dichlorobenzene, nonspecific HALOGENATED ORGANICS Chloromethane Bromomethane Vinyl Chloride Chloroethane Vinyl Chloride Chloroethane Vinyl Chloride Chloroethane Vinyl Chloride Chloroethane Vinyl Chloride Chloroethane Vinyl Chloride Vinyl Chloride Vinyl Chloride Vinyl Chloride Vinyl Chloride Vinyl Chloride Vinyl Chloride Vinyl Chloride Vinyl Chloride Vinyl Chloride Vinyl Chloride Vinyl Chloride Vinyl Chloroethane Vinyl Chloride Vinyl Acetate Vinyl A		
Chlorobenzene	Styrene	0.6 ND
Chlorobenzene		1
Chlorobenzene	CHLORINATED AROMATICS	
1,3-Dichlorobenzene		0.1 LT
Dichlorobenzene, nonspecific		
HALOGENATED ORGANICS		
Chloromethane	Licitoropenzene, nonspecific	I 1.0
Chloromethane		
Description		
Vinyl Chloride 1.8 LT Chloroethane 0.64 LT Methylene Chloride 4.4 LT 1,1-Dichloroethene 0.27 LT 1,1-Dichloroethane 0.49 LT 1,2-Dichloroethylenes (cis and trans isomers) 0.32 LT Chloroform 0.24 LT 1,2-Dichloroethane 0.32 LT 1,2-Dichloroethane 0.2 LT Carbon Tetrachloride 0.31 LT Bromodichloromethane 0.2 LT 1,2-Dichloropropane 0.53 LT Trichloroethene 0.23 LT 1,3-Dichloropropane 0.2 LT Dibromochloromethane 0.25 LT 1,1,2-Trichloroethane 0.5 LT 2-Chloroethylvinyl Ether 0.5 LT Bromoform 0.2 LT 1,1,2-Tetrachloroethane 0.5 LT 1,1,2-Tetrachloroethane 0.5 LT 1,1,2-Tetrachloropropene 0.6 ND cis-1,3-Dichloropropene 0.6 ND trans-1,3-Dichloropropene 0.6 ND watering 0.6 ND WATER SOLUBLES Acetone <	Chloromethane	
Vinyl Chloride 1.8 LT Chloroethane 0.64 LT Methylene Chloride 4.4 LT 1,1-Dichloroethene 0.27 LT 1,1-Dichloroethane 0.49 LT 1,2-Dichloroethylenes (cis and trans isomers) 0.32 LT Chloroform 0.24 LT 1,2-Dichloroethane 0.32 LT 1,1-Trichloroethane 0.2 LT Carbon Tetrachloride 0.31 LT Bromodichloromethane 0.2 LT 1,2-Dichloropropane 0.53 LT Trichloroethene 0.23 LT 1,3-Dichloropropane 0.2 LT Dibromochloromethane 0.25 LT 1,1,2-Trichloroethane 0.5 LT 2-Chloroethylvinyl Ether 0.5 LT Bromoform 0.2 LT 1,1,2-Tetrachloroethane 0.2 LT 1,1,2-Tetrachloroethane 0.5 LT 1,1,2-Tetrachloropropene 0.6 ND trans-1,3-Dichloropropene 0.6 ND trans-1,3-Dichloropropene 0.6 ND water 0.6 ND WATER SOLUBLES Acetone <	Bromomethane	0.26 LT
Chloroethane Methylene Chloride Methylene Chloride 4.4 LT 1,1-Dichloroethene 0.27 LT 1,1-Dichloroethane 0.49 LT 1,2-Dichloroethylenes (cis and trans isomers) 0.32 LT 1,2-Dichloroethane 0.24 LT 1,2-Dichloroethane 0.24 LT 1,2-Dichloroethane 0.25 LT 1,1-Trichloroethane 0.2 LT 1,1-Trichloroethane 0.2 LT 1,2-Dichloropropane 0.53 LT 1,2-Dichloropropane 0.53 LT 1,2-Dichloropropane 0.53 LT 1,2-Dichloropropane 0.23 LT 1,3-Dichloropropane 0.25 LT 1,1-Z-Trichloroethane 0.25 LT 1,1,2-Trichloroethane 0.25 LT 1,1,2-Trichloroethane 0.55 LT 1,1,2-Trichloroethane 0.55 LT 1,1,2-Trichloroethane 0.55 LT 1,1,2-Trichloroethane 0.55 LT 1,1,2-Trichloroethane 0.55 LT 1,1,2-Trichloroethane 0.55 LT 1,1,2-Trichloroethane 0.55 LT 1,1,2-Trichloroethane 0.55 LT 1,1,2-Trichloroethane 0.55 LT 1,1,2-Trichloroethane 0.55 LT 1,1,2-Trichloroethane 0.55 LT 1,1,2-Trichloropropene 0.56 ND 1,1,2-Trichloropropene 1,1,2-Trichloropropene 1,1,2-Trichloropropene 1,1,2-Trichloropropene 1,1,2-Trichloropropene 1,1,2-Trichloropropene 1,1,2-Trichloropropene 1,1,2-Trichloropropene 1,1,2-Trichloropropene 1,1,2-Trichloropropene 1,1,2-Trichloropropene 1,1,2-Trichloropropene 1,1,2-Trichloropropene 1,1,2-Trichloropropene 1,1,2-Trichloropropene 1,1,2-Trichloropropene 1		18 IT
Methylene Chloride 4.4 LT 1,1-Dichloroethene 0.27 LT 1,1-Dichloroethane 0.49 LT 1,2-Dichloroethylenes (cis and trans isomers) 0.32 LT Chloroform 0.24 LT 1,2-Dichloroethane 0.22 LT 1,1-Trichloroethane 0.2 LT Carbon Tetrachloride 0.31 LT Bromodichloromethane 0.2 LT 1,2-Dichloropropane 0.53 LT Tirchloroethene 0.23 LT 1,3-Dichloropropane 0.25 LT Dibromochloromethane 0.25 LT 1,1,2-Trichloroethane 0.25 LT 2-Chloroethylvinyl Ether 0.5 LT Bromoform 0.2 LT 1,1,2-Tetrachloroethane 0.2 LT 1,1,2-Trichloroethane 0.2 LT 1,1,2-Tetrachloroethane 0.2 LT Totrachloroptopene 0.6 ND trans-1,3-Dichloropropene 0.6 ND trans-1,3-Dichloropropene 0.6 ND WATER SOLUBLES Acetone 3.3 LT 2-Butanone 4.3 LT 4-Methyl-2-Pentanone		
1,1-Dichloroethane		4.4 LT
1,1-Dichloroethane	1 ,	
1,2-Dichloroethylenes (cis and trans isomers)	1,1-Dichloroethene	
Chloroform	1,1-Dichloroethane	0.49 LT
Chloroform	1.2-Dichlomethylenes (cis and trans isomers)	0.32 LT
1,2-Dichloroethane		
1,1,1-Trichloroethane		
Carbon Tetrachloride 0.31 LT Bromodichloromethane 0.2 LT 1,2-Dichloropropane 0.53 LT Trichloroethene 0.23 LT 1,3-Dichloropropane 0.25 LT Dibromochloromethane 0.25 LT 1,1,2-Trichloroethane 0.33 LT 2-Chloroethylvinyl Ether 0.5 LT Bromoform 0.5 LT 1,1,2-Tetrachloroethane 0.5 LT 1,1,2-Tetrachloroethane 0.2 LT Tetrachloroethene 0.16 LT Carbon Disulfide 0.6 ND cis-1,3-Dichloropropene 0.6 ND water Solubles 0.6 ND WATER SOLUBLES 3.3 LT Acetone 3.3 LT 2-Hexanone 4.3 LT 4-Methyl-2-Pentanone 0.63 LT 2-Hexanone 1 ND OTHER 2 LT Acrylonitrile 2 LT Trichlorofluoromethane 0.23 LT Vinyl Acetate 1 ND TOTAL PETROLEUM HYDROCARBONS (ug/g) 86000 Collection Date 26-Jan-94		
Bromodichloromethane		
1,2-Dichloropropane	Carbon Tetrachloride	0.31 LT
Trichloroethene 0.23 LT 1,3-Dichloropropane 0.25 LT 1,2-Dichloropropane 0.25 LT 1,1,2-Trichloroethane 0.33 LT 0.5 LT 1,1,2,2-Tetrachloroethane 0.5 LT 1,1,2,2-Tetrachloroethane 0.2 LT 1,1,2,2-Tetrachloroethane 0.2 LT 1,1,2,2-Tetrachloroethane 0.2 LT 1,1,2,2-Tetrachloroethane 0.16 LT 0.1	Bromodichloromethane	0.2 LT
Trichloroethene 0.23 LT 1,3-Dichloropropane 0.25 LT 1,2-Dichloropropane 0.25 LT 1,1,2-Trichloroethane 0.33 LT 0.5 LT 1,1,2,2-Tetrachloroethane 0.5 LT 1,1,2,2-Tetrachloroethane 0.2 LT 1,1,2,2-Tetrachloroethane 0.2 LT 1,1,2,2-Tetrachloroethane 0.2 LT 1,1,2,2-Tetrachloroethane 0.16 LT 0.1		0.53 LT
1,3-Dichloropropane		
Dibromochloromethane		
1,1,2-Trichloroethane		
2-Chloroethylvinyl Ether Bromoform		
Bromoform	1,1,2-Trichloroethane	
Bromoform	2-Chloroethylvinyl Ether	0.5 LT
1,1,2,2-Tetrachloroethane 0.2 LT Tetrachloroethene 0.16 LT Carbon Disulfide 0.6 ND cis-1,3-Dichloropropene 0.6 ND water Solubles 0.6 ND Acetone 3.3 LT 2-Butanone 4.3 LT 4-Methyl-2-Pentanone 0.63 LT 2-Hexanone 1 ND OTHER 2 LT Acrylonitrile 0.23 LT Trichlorofluoromethane 0.23 LT Vinyl Acetate 1 ND TOTAL PETROLEUM HYDROCARBONS (ug/g) 86000 Collection Date 18-Jan-94 Extraction Date 26-Jan-94 Analysis Date 26-Jan-94		0.2 LT
Tetrachloroethene		02 IT
Carbon Disulfide 0.6 ND cis-1,3-Dichloropropene 0.6 ND WATER SOLUBLES 0.6 ND Acetone 3.3 LT 2-Butanone 4.3 LT 4-Methyl-2-Pentanone 0.63 LT 2-Hexanone 1 ND OTHER 2 LT Acrylonitrile 0.23 LT Vinyl Acetate 1 ND TOTAL PETROLEUM HYDROCARBONS (ug/g) 86000 Collection Date 18-Jan-94 Extraction Date 26-Jan-94 Analysis Date 26-Jan-94		
cis-1,3-Dichloropropene 0.6 ND water solubles 0.6 ND Acetone 3.3 LT 2-Butanone 4.3 LT 4-Methyl-2-Pentanone 0.63 LT 2-Hexanone 1 ND OTHER 2 LT Acrylonitrile 0.23 LT Vinyl Acetate 1 ND TOTAL PETROLEUM HYDROCARBONS (ug/g) 86000 Collection Date 18-Jan-94 Extraction Date 26-Jan-94 Analysis Date 26-Jan-94		
trans-1,3-Dichloropropene 0.6 ND WATER SOLUBLES Acetone 3.3 LT 2-Butanone 4.3 LT 4-Methyl-2-Pentanone 0.63 LT 2-Hexanone 1 ND OTHER Acrylonitrile 2 LT Trichlorofluoromethane 0.23 LT Vinyl Acetate 1 ND TOTAL PETROLEUM HYDROCARBONS (ug/g) 86000 Collection Date 18-Jan-94 Extraction Date 26-Jan-94 Analysis Date 26-Jan-94		***
WATER SOLUBLES		
WATER SOLUBLES Acetone 3.3 LT 2-Butanone 4.3 LT 4-Methyl-2-Pentanone 0.63 LT 2-Hexanone 1 ND OTHER 2 LT Acrylonitrile 2.23 LT Trichlorofluoromethane 0.23 LT Vinyl Acetate 1 ND TOTAL PETROLEUM HYDROCARBONS (ug/g) 86000 Collection Date 18-Jan-94 Extraction Date 26-Jan-94 Analysis Date 26-Jan-94	trans-1,3-Dichloropropene	0.6 ND
Acetone 3.3 LT		
Acetone 3.3 LT	WATER SOLUBLES	
2-Butanone		3.3 LT
4-Methyl-2-Pentanone 2-Hexanone OTHER Acrylonitrile Trichlorofluoromethane Vinyl Acetate TOTAL PETROLEUM HYDROCARBONS (ug/g) Collection Date Extraction Date Extraction Date Analysis Date 0.63 LT 1 ND 2 LT 0.23 LT 1 ND 4 86000 86000		
2-Hexanone 1 ND OTHER Acrylonitrile 2 LT Trichlorofluoromethane 0.23 LT Vinyl Acetate 1 ND TOTAL PETROLEUM HYDROCARBONS (ug/g) 86000 Collection Date 18-Jan-94 Extraction Date 26-Jan-94 Analysis Date 26-Jan-94		4.3 LI
OTHER Acrylonitrile 2 LT Trichlorofluoromethane 0.23 LT Vinyl Acetate 1 ND TOTAL PETROLEUM HYDROCARBONS (ug/g) 86000 Collection Date 18-Jan-94 Extraction Date 26-Jan-94 Analysis Date 26-Jan-94		
Acrylonitrile 2 LT Trichlorofluoromethane 0.23 LT Vinyl Acetate 1 ND TOTAL PETROLEUM HYDROCARBONS (ug/g) 86000 Collection Date 18-Jan-94 Extraction Date 26-Jan-94 Analysis Date 26-Jan-94	2-Hexanone	1 ND
Acrylonitrile 2 LT Trichlorofluoromethane 0.23 LT Vinyl Acetate 1 ND TOTAL PETROLEUM HYDROCARBONS (ug/g) 86000 Collection Date 18-Jan-94 Extraction Date 26-Jan-94 Analysis Date 26-Jan-94		
Trichlorofluoromethane 0.23 LT Vinyl Acetate 0.23 LT 1 ND TOTAL PETROLEUM HYDROCARBONS (ug/g) 86000 Collection Date 18-Jan-94 26-Jan-94 Analysis Date 26-Jan-94		
Trichlorofluoromethane 0.23 LT Vinyl Acetate 0.23 LT 1 ND TOTAL PETROLEUM HYDROCARBONS (ug/g) 86000 Collection Date 18-Jan-94 26-Jan-94 Analysis Date 26-Jan-94	Acrylonitrile	2 LT
Vinyl Acetate 1 ND TOTAL PETROLEUM HYDROCARBONS (ug/g) 86000 Collection Date 18-Jan-94 Extraction Date 26-Jan-94 Analysis Date 26-Jan-94		
TOTAL PETROLEUM HYDROCARBONS (ug/g) Collection Date Extraction Date 26-Jan-94 Analysis Date 26-Jan-94		
Collection Date 18-Jan-94 Extraction Date 26-Jan-94 Analysis Date 26-Jan-94	Viriyi Acetate	טא ו
Collection Date 18-Jan-94 Extraction Date 26-Jan-94 Analysis Date 26-Jan-94		
Collection Date 18-Jan-94 Extraction Date 26-Jan-94 Analysis Date 26-Jan-94		
Extraction Date 26-Jan-94 Analysis Date 26-Jan-94	TOTAL PETROLEUM HYDROCARBONS (ug/g)	86000
Extraction Date 26-Jan-94 Analysis Date 26-Jan-94		
Analysis Date 26-Jan-94	Collection Date	
Analysis Date 26-Jan-94	Extraction Date	
	Analysis Date	26-Jan-94

Notes:
(1) LT - less than detection limit; ND - not detected

TABLE FTA-5: Semivolatile Organic Compounds in Sediment from the Fire Training Area Fort George G. Meade, Maryland Page 1 of 2

te ID	FTASE-1
Field Sample ID	F1D0001A
Site Type Start Depth (ft)	SUMP
End Depth (it)	0.5
Media	CSE
QC Type	- WL
SEMIVOLATILE ORGANIC COMPOUNDS (ug/g)	
CHI CRIMATER MOMOCYCLIC ADDITION	
CHLORINATED MONOCYCLIC AROMATICS 1.3-Dichlorobenzene	11.0
1,4-Dichlorobenzene	0.042 LT
1.2-Dichlorobenzene	0.034 LT
1,2,4-Trichlorobenzene	0.22 LT
1,2,3-Trichlorobenzene	0.032 LT
Hexachlorobenzene	0.08 LT
NITROSAMINES	
N-Nitroso dimethylamine	646.11
N-Nitroso-Di-n-Propylamine	0.46 LT 1.1 LT
N-Nitroso diphenylamine	60
	~ I
NITROMONOCYCLIC AROMATICS	
Nitrobenzene	1.8 LT
3-Nitrotoluene 2,6-Dinitrotoluene	0.34 LT
2.4-Dinitrotoluene	0.32 LT 1.4 LT
	1.4 L1
PHENOLS	
Phenol	0.052 LT
2-Chlorophenol	0.055 LT
2-Methyl Phenol	0.098 LT
4-Methýl Phenol 2-Nitrophenol	0.24 LT
2,4-Dimethylphenol	1.1 LT 3 LT
2,4-Dichlorophenol	0.065 LT
p-Chloro-m-cresol (4-Chloro-3-methylphenol)	0.93 LT
2.4,6-Trichlorophenol	0.061 LT
,5-Trichlorophenol	0.49 LT
a,6-Trichlorophenol	0.62 LT
2,4-Dinitrophenol 4-Nitrophenol	4.7 LT
Methyl-4,6-Dinitrophenol	3.3 LT
Dibenzofuran	0.8 LT 0.38 LT
Pentachlorophenol	0.76 LT
	00 2.
PCB's	
PCB-1016 PCB-1221	0.32 LT
PCB-1221	0.32 ND
PCB-1242	0.32 ND
PC8-1248	0.32 ND 0.32 ND
PCB-1254	0.32 ND
PCB-1260	0.79 LT
PCB-1262	6.3 LT
PHTHALATES	
Dimethyl Phthalate	0.063 LT
Diethyl Phthalate	0.063 L1 0.24 LT
Di-n-butyl Phthalate	1.3 LT
Butyl Benzyl Phthalate	1.8 LT
Bis (2-Ethyl hexyl) Phthalate	7.8
Di-n-octyl Phthalate	0.23 LT
POLYNUCLEAR AROMATICS	
Naphthalene Naphthalene	30
2-Methylnaphthalene	70
2-Chloronaphthalene	0.24 LT
Acenaphthylene	0.033 LT
Acenaphthene	0.041 LT
Fluorene	27
Phenanthrene Anthracene	60
Fluoranthrene	23
Pyrene	2.2 6.8
	0.0

TABLE FTA-5: Semivolatile Organic Compounds in Sediment from the Fire Training Area Fort George G. Meade, Maryland Page 2 of 2

Collection Date 18-Jan-94 Extraction Date 20-Jan-94	rage 2 of 2	
Ste Type		
Start Depth (ft)		
Depth (t) Dept		
Media		
POLYNUCLEAR AROMATICS		CSE
Pol.YNUCLEAR AROMATICS		
Bertzo (a) Anthracene		
Chrysene 2.7 Berzo (b) Fluoranthene 0.31 IT		0.043 11
Berzo (N Fluoranthene 0.31 LT		
Benzo (k) Fluoranthene 0.13 LT Indeno (1,2,3,cd) Pyrene 1.2 LT Indeno (1,2,3,cd) Pyrene 0.18 LT Indeno (1,2,3,cd) Pyrene 0.18 LT Indeno (1,2,3,cd) Pyrene 0.18 LT Indeno (1,2,3,cd) Pyrene 0.18 LT Indeno (1,2,3,cd) Pyrene 0.18 LT Indeno (1,2,3,cd) Pyrene 0.18 LT Indeno (1,2,3,cd) Pyrene 0.18 LT Indeno (1,2,3,cd) Pyrene 0.18 LT Indeno (1,2,3,cd) Pyrene 0.065 LT Lindane (9,BHC) 0.1 LT Lindane (9,BHC) 0.1 LT Lindane (9,BHC) 0.1 LT Heptachlor 0.24 LT Malathion 0.18 LT Heptachlor 0.24 LT Malathion 0.18 LT Parathion 1.7 LT Aldrin 0.92 LT Isodrin 0.48 LT Heptachlor Epoxide 0.48 LT Lindane 0.68 LT Chiordane 0.68 LT Chiordane 0.68 LT Chiordane 0.68 LT Chiordane 0.68 LT Chiordane 0.68 LT Chiordane 0.68 LT Chiordane 0.68 LT Chiordane 0.68 LT Chiordane 0.68 LT Chiordane 0.68 LT Chiordane 0.68 LT Chiordane 0.68 LT Chiordane 0.68 LT Chiordane 0.68 LT Chiordane 0.64 LT Lindane 1.8 LT Lindan		
Berzo (a) Pyrene		
Indexno (1/2,3,cd) Pyrene 2.4 LT	Benzo (a) Pyrene	
PESTICIDES	Indeno (1,2,3,cd) Pyrene	
PESTICIDES Appa-BHC	Dibenzo (a,h) Anthracene	
Alpha BHC	Benzo (gni) Perylene	0.10 L1
Alpha BHC	PESTICIDES	
Artazinio Lindane (g-BHC) Delta-BHC Undane (g-BHC) Delta-BHC Undane (g-BHC) Delta-BHC Undane (g-BHC) Delta-BHC Undane (g-BHC) Delta-BHC Undane (g-BHC) Undan		
Lindane (g.BHC)	Beta-BHC	
Deliza BHC		
Heptachlor	Lindane (g-BHC)	
Malathion 0.18 LT Parathion 1.7 LT Aldrin 1.3 LT Supona 0.92 LT Isodrin 0.48 LT Heptachlor Epoxide 0.48 LT Heptachlor Epoxide 0.68 LT Vapona 0.68 LT Vapona 0.68 LT Vapona 0.68 LT Vapona 0.68 LT Vapona 0.68 LT Vapona 0.68 LT Vapona 0.68 LT Vapona 0.068 LT Vapona 0.068 LT Vapona 0.068 LT Vapona 0.068 LT Landinin 0.4 LT Landinin 1.8 LT Landinin 1.		
Parathion		
Aldrin Supona Su		1.7 LT
Sodrin		
Heptachlor Epoxide		
Chlordane		
0.068 LT		
Endosultan		
4,4*DDE 0.068 LT Dieldrin 0.079 LT Endrin Aldehyde 1.8 LT Endrine 1.3 LT 4,4*DDD 0.064 LT Endosulfan II 2.4 LT 4,4*DDT 0.1 LT Endosulfan Sulfate 1.2 LT Methoxychlor 0.26 LT Mirex 0.14 LT Endrine Ketone 0.28 ND Toxaphene 12 LT SULFUR CONTAINING p-Chlorophenylmethyl Sulfoxide 0.07 LT p-Chlorophenylmethyl Sulfoxide 0.097 LT 4-Chlorophenylmethyl Sulfone 0.066 LT OTHER 1,4-Oxathaine (Thioxane) 0.075 LT Bis (2-Chloroethyl) Ether 0.36 LT Dicyclopentadiene 0.57 LT Benzyl Alcohol 0.032 LT Bis (2-Chloroethane 0.065 LT Dibromochloropropane 0.071 LT Isophorone 0.091 LT Bis (2-Chloroethayl) Methane 0.19 LT Benzoic Acid 3.1 ND 4-Chloropaniline 0.63 ND Hevachlorobutadiene 0.17 LT <t< td=""><td></td><td></td></t<>		
Endrin Aldehyde		0.068 LT
Endrine	Dieldrin	
4,4*DDD 0.064 LT Endosulfan II 2.4 LT 4,4*DDT 0.1 LT Endosulfan Sulfate 1.2 LT Methoxychlor 0.26 LT Mirex 0.14 LT Endrine Ketone 0.28 ND Toxaphene 12 LT SULFUR CONTAINING P-Chlorophenylmethyl Sulfoxide 0.097 LT P-Chlorophenylmethyl Sulfoxide 0.097 LT P-Chlorophenylmethyl Sulfone 0.066 LT OTHER 1,4-Oxathaine (Thioxane) 0.075 LT Bis (2-Chloroethyl) Ether 0.36 LT Dicyclopentadiene 0.075 LT Berzyl Alcohol 0.032 LT Bis (2-Chloroethoxyl) Ether 0.04 LT Dibromochloropropane 0.05 LT It polycomochloropropane 0.071 LT Isophorone 0.39 LT Berzycic Acid 3.1 ND 4-Chloroaniline 0.63 ND Hevachlorobutadiene 0.97 LT 2-Nitroniline 3.1 ND 4-Chlorophenyl Phenyl Ether 0.17 LT 1,2-Diphenyl Hydrazine 0.52 LT 2,6-Dinitroanilin		
Endosulfan II		
4,4'DDT		
Endosulfan Sulfate		
Methoxychlor 0.26 LT Mirex 0.14 LT Endrine Ketone 0.28 ND Toxaphene 12 LT SULFUR CONTAINING p-Chlorophenylmethyl Sulfoxide 0.097 LT p-Chlorophenylmethyl Sulfoxe 0.097 LT Chlorophenylmethyl Sulfoxe O.066 LT OTHER 1,4-Oxathaine (Thioxane) 0.075 LT Bis (2-Chloroethyl) Ether 0.36 LT Dicyclopentadiene 0.57 LT Benzyl Alcohol 0.032 LT Bis (2-Chloroisopropyl) Ether 0.44 LT Ditriane 0.065 LT Hexachloroethane 1.8 LT Dibromochloropropane 0.071 LT Isophorone 0.39 LT Benzoic Acid 3.1 ND 4-Chloroaniline 0.63 ND Hevachlorobutadiene 3.1 ND 2-Nitroniline 3.1 ND 4-Chlorophenyl Phenyl Ether 0.17 LT 1,2-Diphenyl Hydrazine 0.52 LT 2,6-Dinitroaniline 0.041 LT 4-Bromophenyl Pheny		
Endrine Ketone	Methoxychlor	
Toxaphene		
SULFUR CONTAINING D-Chlorophenylmethyl Sulfoxide D.32 LT		
p-Chlorophenylmethyl Sulfoxide 0.32 LT p-Chlorophenylmethyl Sulfide 0.097 LT 4-Chlorophenylmethyl Sulfone 0.066 LT OTHER 1,4-Oxathaine (Thioxane) 0.075 LT Bis (2-Chloroethyl) Ether 0.36 LT Dicyclopentadiene 0.032 LT Benzyl Alcohol 0.032 LT Bis (2-Chloroisopropyl) Ether 0.44 LT Dithiane 1.8 LT Hexachloroethane 1.8 LT Dibromochloropropane 0.071 LT Isophorone 0.39 LT Bis (2-Chloroethoxy) Methane 0.19 LT Berzoic Acid 3.1 ND 4-Chloroaniline 0.63 ND 4-Chloroaniline 0.63 ND 4-Chloroaniline 3.1 ND 4-Nitroaniline 3.1 ND 4-Chlorophenyl Phenyl Ether 0.17 LT 1,2-Diphenyl Hydrazine 0.52 LT 2,6-Dinitroaniline 0.51 LT 4-Bromophenyl Phenyl Ether 0.041 LT 3,5-Dinitroaniline 0.52 LT 4-Bromophenyl Phenyl Ether 0.52 LT	TOTAL TOTAL	
p-Chlorophenylmethyl Sulfide 4-Chlorophenylmethyl Sulfide 7.4-Oxathaine (Thioxane) 8-2-Chloroethyl) Ether 9.036 LT 9-2-Chloroethyl) Ether 9.032 LT 9-2-Chloroethyl) Ether 9.032 LT 9-2-Chloroethyl Ether 9.044 LT 9-2-Chloroethane 9.065 LT 9-2-Chloroethane 9.071 LT 9-2-Chloroethoxy) Methane 9.039 LT 9-2-Chloroethoxy) Methane 9.039 LT 9-2-Chloroethoxy) Methane 9.039 LT 9-2-Chloroethoxy) Methane 9.039 LT 9-2-Chloroethoxy) Methane 9.039 LT 9-2-Chloroethoxy) Methane 9.039 LT 9-2-Chloroethoxy) Methane 9.039 LT 9-2-Chloroethoxy) Methane 9.039 LT 9-2-Chloroethoxy) Methane 9.039 LT 9-2-Chloroethoxy) Methane 9.039 LT 9-2-Chloroethoxy) Methane 9.030 LT 9-2-Chloroethoxy) Methane 9.030 LT 9-2-Chloroethoxy) Methane 9.030 LT 9-2-Chloroethoxy) Methane 9.030 LT 9-2-Chloroethoxy) Methane 9.030 LT 9-2-Chloroethoxy) Methane 9.030 LT 9-2-Chloroethoxy) Methane 9.030 LT 9-2-Chloroethoxy) Methane 9.030 LT 9-3-Chloroethoxy) Methane 9.030 LT 9-3-Chloroethoxy) Methane 9.030 LT 9-3-Chloroethoxy) Methane 9.030 LT 9-3-Chloroethoxy) Methane 9.030 LT 9-3-Chloroethoxy) Methane 9.030 LT 9-3-Chloroethoxy) Methane 9.030 LT 9-3-Chloroethoxy) Methane 9.030 LT 9-3-Chloroethoxy) Methane 9.030 LT 9-3-Chloroethoxy) Methane 9.030 LT 9-3-Chloroethoxy) Methane 9.030 LT 9-3-Chloroethoxy) Methane 9.030 LT 9.040 LT 9-3-Chloroethoxy) Methane 9.030 LT 9.040 LT 9-3-Chloroethoxy) Methane 9.031 LT 9.050 LT 9-3-Chloroethoxy) Methane 9.032 LT 9-3-Chloroethoxy) Methane 9.032 LT 9.040 LT 9-3-Chloroethoxy) Methane 9.032 LT 9-3-Chloroethoxy) Methane 9.040 LT 9-3-Chloroethoxy) Methane 9.050 LT 9-3-Chloroethoxy) Methane 9.050 LT 9-3-Chloroethoxy) Methane 9.050 LT 9-3-Chloroethoxy) Methane 9.050 LT 9-3-Chloroethoxy) Methane 9.050 LT 9-3-Chloroethoxy) Methane 9.050 LT 9-3-Chloroethoxy Methane 9.050 LT 9-3-Chloroethoxy Methane 9.050 LT 9-3-Chloroethoxy Methane 9.050 LT 9-3-Chloroethoxy Methane 9.050 LT 9-3-Chloroethoxy Methane 9.050 LT 9-3-Chloroethoxy Methane 9.050 LT 9-3-Chloroethoxy Methane 9.050 LT 9-3-Chloroethoxy Methane 9.050 LT 9-3-Chloroethoxy Methane 9.050 LT 9-3-Chl		
4-Chlorophenylmethyl Sulfone OTHER OTHER Bis (2-Chloroethyl) Ether Dicyclopentadiene Bis (2-Chloroisopropyl) Ether Dicyclopentadiene Bis (2-Chloroisopropyl) Ether Dithiane Hevachloroethane Dibromochloropropane Bis (2-Chloroisopropane Dibromochloropropane Bis (2-Chloroisopropane Bis (2-Chloroisopropane Bis (2-Chloroisopropane Dibromochloropropane Bis (2-Chloroisopropane Dibromochloropropane Bis (2-Chloroisopropane Dibromochloropropane Dib		
OTHER 1,4-Oxathaine (Thioxane) 0.075 LT Bis (2-Chloroethyl) Ether 0.57 LT Dicyclopentadiene 0.032 LT Benzyl Alcohol 0.032 LT Bis (2-Chloroisopropyl) Ether 0.44 LT Dithiane 0.065 LT Hexachloroethane 1.8 LT Dibromochloropropane 0.071 LT Isophorone 0.39 LT Bis (2-Chloroethoxy) Methane 0.19 LT Benzoic Acid 3.1 ND 4-Chloroaniline 0.63 ND Hexachlorobutadiene 0.97 LT 2-Nitroniline 3.1 ND 3-Nitroaniline 3.1 ND 4-Chlorophenyl Phenyl Ether 0.17 LT 1,2-Diphenyl Hydrazine 0.52 LT 2,6-Dinitroaniline 0.57 LT 4-Bromophenyl Phenyl Ether 0.041 LT 3,5-Dinitroaniline 1.6 LT Hexachlorocyclopentadiene 0.52 LT 3,3-Dichloroberizidine 1.6 LT Collection Date 18-Jan-94		
1,4-Oxathaine (Thioxane) 0.075 LT Bis (2-Chloroethyl) Ether 0.36 LT Dicyclopentadiene 0.57 LT Benzyl Alcohol 0.032 LT Bis (2-Chloroisopropyl) Ether 0.44 LT Dithiane 0.065 LT Hexachloroethane 1.8 LT Dibromochloropropane 0.071 LT Isophorone 0.39 LT Bis (2-Chloroethoxy) Methane 0.19 LT Benzoic Acid 3.1 ND 4-Chloroaniline 0.63 ND 4-Chloroaniline 0.97 LT 2-Nitroniline 3.1 ND 3-Nitroaniline 3.1 ND 4-Chlorophenyl Phenyl Ether 0.17 LT 1,2-Diphenyl Hydrazine 0.52 LT 2,6-Dinitroaniline 0.51 LT 4-Bromophenyl Phenyl Ether 0.041 LT 3,5-Dinitroaniline 1.6 LT Hexachlorocyclopentadiene 0.52 LT 3,3-Dichloroberizidine 1.6 LT Collection Date 18-Jan-94 Extraction Date 20-Jan-94	4-Chlorophenylmethyl Sulfone	0.000 L1
1,4-Oxathaine (Thioxane) 0.075 LT Bis (2-Chloroethyl) Ether 0.36 LT Dicyclopentadiene 0.57 LT Benzyl Alcohol 0.032 LT Bis (2-Chloroisopropyl) Ether 0.44 LT Dithiane 0.065 LT Hexachloroethane 1.8 LT Dibromochloropropane 0.071 LT Isophorone 0.39 LT Bis (2-Chloroethoxy) Methane 0.19 LT Benzoic Acid 3.1 ND 4-Chloroaniline 0.63 ND 4-Chloroaniline 0.97 LT 2-Nitroniline 3.1 ND 3-Nitroaniline 3.1 ND 4-Chlorophenyl Phenyl Ether 0.17 LT 1,2-Diphenyl Hydrazine 0.52 LT 2,6-Dinitroaniline 0.51 LT 4-Bromophenyl Phenyl Ether 0.041 LT 3,5-Dinitroaniline 1.6 LT Hexachlorocyclopentadiene 0.52 LT 3,3-Dichloroberizidine 1.6 LT Collection Date 18-Jan-94 Extraction Date 20-Jan-94	OTHER	
Bis (2-Chloroethyl) Ether 0.36 LT Dicyclopentadiene 0.57 LT Benzyl Alcohol 0.032 LT Bis (2-Chloroisopropyl) Ether 0.44 LT Dithiane 0.065 LT Hexachloroethane 1.8 LT Dibromochloropropane 0.071 LT Isophorone 0.39 LT Bis (2-Chloroethoxy) Methane 0.19 LT Benzoic Acid 3.1 ND 4-Chloroaniline 0.63 ND Hevachlorobutadiene 0.97 LT 2-Nitroniline 3.1 ND 3-Nitroaniline 3.1 ND 4-Chlorophenyl Phenyl Ether 0.17 LT 1,2-Diphenyl Hydrazine 0.52 LT 2,6-Dinitroaniline 0.51 LT 4-Bromophenyl Phenyl Ether 0.041 LT 3,5-Dinitroaniline 1.6 LT Hexachlorocyclopentadiene 0.52 LT 3,3-Dichloroberizidine 1.6 LT		0.0.0
Dicyclopentadiene 0.57 LT Benzyl Alcohol 0.032 LT Bis (2-Chloroisopropyl) Ether 0.44 LT Dithiane 0.065 LT Hexachloroethane 1.8 LT Dibromochloropropane 0.071 LT Isophorone 0.39 LT Bis (2-Chloroethoxy) Methane 0.19 LT Berzoic Acid 3.1 ND 4-Chloroaniline 0.63 ND Hexachlorobutadiene 0.97 LT 2-Nitroniline 3.1 ND 3-Nitroaniline 3 LT 4-Nitroaniline 3.1 ND 4-Chlorophenyl Phenyl Ether 0.17 LT 1,2-Diphenyl Hydrazine 0.52 LT 2,6-Dinitroaniline 0.57 LT 4-Bromophenyl Phenyl Ether 0.041 LT 3,5-Dinitroaniline 0.52 LT 4-Bromophenyl Phenyl Ether 0.52 LT 3,3'-Dichlorobenzidine 1.6 LT Collection Date 18-Jan-94 Extraction Date 20-Jan-94		
Bis (2-Chloroisopropyl) Ether 0.44 LT Dithiane 0.065 LT Hexachloroethane 1.8 LT Dibromochloropropane 0.071 LT Isophorone 0.39 LT Bis (2-Chloroethoxy) Methane 0.19 LT Benzoic Acid 3.1 ND 4-Chloroaniline 0.63 ND Hexachlorobutadiene 0.97 LT 2-Nitroniline 3.1 ND 3-Nitroaniline 3.1 ND 4-Chlorophenyl Phenyl Ether 0.17 LT 1,2-Diphenyl Hydrazine 0.52 LT 2,6-Dinitroaniline 0.57 LT 4-Bromophenyl Phenyl Ether 0.041 LT 3,5-Dinitroaniline 1.6 LT Hexachlorocyclopentadiene 0.52 LT 3,3-Dichloroberizidine 1.6 LT	Dicyclopentadiene	0.57 LT
Dithiane 0.065 LT Hexachloroethane 1.8 LT Dibromochloropropane 0.071 LT Isophorone 0.39 LT Bis (2-Chloroethoxy) Methane 0.19 LT Benzoic Acid 3.1 ND 4-Chloroaniline 0.63 ND Hexachlorobutadiene 0.97 LT 2-Nitroaniline 3.1 ND 3-Nitroaniline 3.1 ND 4-Chlorophenyl Phenyl Ether 0.17 LT 1,2-Diphenyl Hydrazine 0.52 LT 2,6-Dinitroaniline 0.52 LT 4-Bromophenyl Phenyl Ether 0.041 LT 3,5-Dinitroaniline 1.6 LT Hexachlorocyclopentadiene 0.52 LT 3,3'-Dichlorobenzidine 1.6 LT Collection Date 18-Jan-94 Extraction Date 20-Jan-94		
Hexachloroethane		
Dibromochloropropane 0.071 LT		
Isophorone 0.39 LT		0.071 LT
Benzoic Acid 3.1 ND	Isophorone	
4-Chloroaniline 0.63 ND Hexachlorobutadiene 0.97 LT 2-Nitroniline 3.1 ND 3-Nitroaniline 3 LT 4-Nitroaniline 3.1 ND 4-Chlorophenyl Phenyl Ether 0.17 LT 1,2-Diphenyl Hydrazine 0.52 LT 2,6-Dinitroaniline 0.57 LT 4-Bromophenyl Phenyl Ether 0.041 LT 3,5-Dinitroaniline 1.6 LT Hexachlorocyclopentadiene 0.52 LT 3,3'-Dichlorobertzidine 1.6 LT		
Hexachlorobutadiene 0.97 LT		
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4-Chlorophenyl Phenyl Ether 0.17 LT 1,2-Diphenyl Hydrazine 0.52 LT 2,6-Dinitroaniline 0.57 LT 4-Bromophenyl Phenyl Ether 0.041 LT 3,5-Dinitroaniline 1.6 LT Hexachlorocyclopentadiene 0.52 LT 3,3-Dichloroberizidine 1.6 LT Collection Date 18-Jan-94 Extraction Date 20-Jan-94		
1,2-Diphenyl Hydrazine 0.52 LT 2,6-Dinitroaniline 0.57 LT 4-Bromophenyl Phenyl Ether 0.041 LT 3,5-Dinitroaniline 1.6 LT Hexachlorocyclopentadiene 0.52 LT 3,3'-Dichlorobenzidine 1.6 LT Collection Date 18-Jan-94 Extraction Date 20-Jan-94		
2.6-Dinitroaniline 0.57 LT 4-Bromophenyl Phenyl Ether 0.041 LT 3,5-Dinitroaniline 1.6 LT Hexachlorocyclopentadiene 0.52 LT 3,3'-Dichlorobenzidine 1.6 LT Collection Date Extraction Date 18-Jan-94 Extraction Date		
4-Bromophenyl Phenyl Ether 0.041 LT 3,5-Dinitroaniline 1.6 LT Hexachlorocyclopentadiene 0.52 LT 3,3-Dichlorobenzidine 1.6 LT Collection Date 18-Jan-94 Extraction Date 20-Jan-94		
3,5-Dinitroaniline 1.6 LT Hexachlorocyclopentadiene 0.52 LT 3,3-Dichlorobenzidine 1.6 LT Collection Date 18-Jan-94 Extraction Date 20-Jan-94		
Hexachlorocyclopentadiene 0.52 LT 3,3'-Dichlorobenzidine 1.6 LT Collection Date 18-Jan-94 Extraction Date 20-Jan-94		
3,3'-Dichlorobenzidine 1.6 LT Collection Date 18-Jan-94 Extraction Date 20-Jan-94		
Extraction Date 20-Jan-94		
Extraction Date 20-Jan-94	3,3'-Dichlorobenzidine	
CASTONIO I DATE		1.6 LT
AUGUSIS LAUF	Collection Date	1.6 LT 18-Jan-94
Notes:		1.6 LT 18-Jan-94

(1) LT - less than detection limit; ND - not detected

Appendix J: Helicopter Hangar Area Analytical Results

Table HHA-1:	Volatile Organic Compounds and Petroleum Hydrocarbons in Soil from the HHA
Table HHA-2:	Volatile Organic Compounds and Petroleum Hydrocarbons in Ground Water from the HHA
Table HHA-3:	Semivolatile Organic Compounds in Ground Water from the HHA
Table HHA-4:	Metals Data for Ground Water from the HHA
Table HHA-5:	Volatile Organic Compounds in Surface Water from the HHA
Table HHA-6:	Semivolatile Organic Compounds in Surface Water from the HHA
Table HHA-7:	Metals in Surface Water from the HHA
Table HHA-8:	Volatile Organic Compounds in Sediment from the HHA
Table HHA-9:	Semivolatile Organic Compounds in Sediment from the HHA
Table HHA-10:	Metals in Sediment from the HHA

Note: The term "LT" indicates that a certified analyte is not detected. The term "ND" is used for analytes that are added to certified methods but have not gone through the certification process. The term "LT" is followed by the certified reporting limit, it does not signify that a compound was actually detected but not included because results were below the Contract Required Detection Limit.

TABLE HHA-1: Volatile Organic Compounds and Petroleum Hydrocarbons in Soil from HHA Fort George G. Meade, Maryland

	-	-	-	-	-
Pa	п	e	- 1	m	
	м	v		•	

Sample Location Identification Field Sample ID Site Type Start Depth (ft bgs) End Depth (ft bgs) End Depth (ft bgs) Media QC Type VOLATILE ORGANIC COMPOUNDS (ug/g) AROMATICS Benzene Toluene Ethylbenzene M-Xylene Xylenes Styrene Chlorobenzene 1,3-Dichlorobenzene Dichlorobenzene, Nonspecific HALOGENATED ORGANICS Chloromethane Bromomethane Vinyl Chloride Chloride Chlorotethane HALOGENATED ORGANICS Chlorotethane Nettylene Chloride 1,1-Dichlorotethane 1,2-Dichl	T T T T T T
Site Type Start Depth (ft bgs) 10	T T T T T T
Start Depth (ft bgs)	T T T T T T
End Depth (it bgs) Media CSO	T T T T T T
Media QC Type	T T T T T T
VOLATILE ORGANIC COMPOUNDS (ug/g) AROMATICS	T T T T T T
AROMATICS Benzene 0.1 LT	T T T T T T
Benzene	T T T T T T
Benzene	T T T T T T
Ethylbenzene	T T D
M-Xylenes 0.23 LT Xylenes 0.78 LT Styrene 0.6 NE CHLORINATED AROMATICS Chlorobenzene 0.1 LT 1,3-Dichlorobenzene 0.14 LT Dichlorobenzene, Nonspecific 0.2 LT HALOGENATED ORGANICS Chioromethane 0.96 LT Bromomethane 0.26 LT Vinyl Chloride 1.8 LT Chloroethane 0.64 LT Methylene Chloride 4.4 LT 1,1-Dichloroethane 0.27 LT 1,2-Dichloroethane 0.32 LT 1,2-Dichloroethane 0.32 LT 1,1-Trichloroethane 0.32 LT 1,1-Trichloroethane 0.2 LT 1,1-Trichloroethane 0.2 LT 1,1-Trichloroethane 0.2 LT 1,2-Dichloroethane 0.31 LT 1,2-Dichloroethane 0.2 LT 1,2-Dichloroethane 0.53 LT 1,2-Dichloropropane 0.53 LT	T D T T
Xylenes 0.78 LT 0.6 NE	T T T
Xylenes 0.78 LT 0.6 NE	D T T
CHLORINATED AROMATICS Chlorobenzene 0.1 LT 1,3-Dichlorobenzene, Nonspecific 0.2 LT HALOGENATED ORGANICS Chloromethane 0.96 LT Bromomethane 0.26 LT Vinyl Chloride 1.8 LT Chloroethane 0.64 LT Methylene Chloride 4.4 LT 1,1-Dichloroethane 0.27 LT 1,2-Dichloroethylenes 0.32 LT Chloroform 0.24 LT 1,2-Dichloroethane 0.32 LT 1,1-Trichloroethane 0.2 LT 2-Tothon Tetrachloride 0.31 LT Bromodichloromethane 0.2 LT 1,2-Dichloropropane 0.53 LT	T T
Chlorobenzene	T T
Chlorobenzene	T T
1,3-Dichlorobenzene 0.14 LT Dichlorobenzene, Nonspecific 0.2 LT HALOGENATED ORGANICS Chloromethane 0.96 LT Bromomethane 0.26 LT Vinyl Chloride 1.8 LT Chloroethane 0.64 LT Methylene Chloride 4.4 LT 1,1-Dichloroethene 0.27 LT 1,1-Dichloroethane 0.49 LT 1,2-Dichloroethylenes 0.32 LT Chloroform 0.24 LT 1,2-Dichloroethane 0.32 LT 1,1-Trichloroethane 0.2 LT Carbon Tetrachloride 0.31 LT Bromodichloromethane 0.2 LT 1,2-Dichloropropane 0.53 LT	T T
Dichlorobenzene, Nonspecific 0.2 LT	Γ
HALOGENATED ORGANICS	Γ
Chloromethane 0.96 LT Bromomethane 0.26 LT Vinyl Chloride 1.8 LT Chloroethane 0.64 LT Methylene Chloride 4.4 LT 1,1-Dichloroethene 0.27 LT 1,1-Dichloroethane 0.49 LT 1,2-Dichloroethylenes 0.32 LT Chloroform 0.24 LT 1,2-Dichloroethane 0.32 LT 1,1-Trichloroethane 0.2 LT Carbon Tetrachloride 0.31 LT Bromodichloromethane 0.2 LT 1,2-Dichloropropane 0.53 LT	
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Bromomethane 0.26 LT Vinyl Chloride 1.8 LT Chloroethane 0.64 LT Methylene Chloride 4.4 LT 1,1-Dichloroethene 0.27 LT 1,1-Dichloroethane 0.49 LT 1,2-Dichloroethylenes 0.32 LT Chloroform 0.24 LT 1,2-Dichloroethane 0.32 LT 1,1-Trichloroethane 0.2 LT Carbon Tetrachloride 0.31 LT Bromodichloromethane 0.2 LT 1,2-Dichloropropane 0.53 LT	
Vinyl Chloride 1.8 LT Chloroethane 0.64 LT Metrylene Chloride 4.4 LT 1,1-Dichloroethene 0.27 LT 1,1-Dichloroethane 0.49 LT 1,2-Dichloroethylenes 0.32 LT Chloroform 0.24 LT 1,2-Dichloroethane 0.32 LT 1,1-Trichloroethane 0.2 LT Carbon Tetrachloride 0.31 LT Bromodichloromethane 0.2 LT 1,2-Dichloropropane 0.53 LT	
Chloroethane 0.64 LT Methylene Chloride 4.4 LT 1,1-Dichloroethene 0.27 LT 1,1-Dichloroethane 0.49 LT 1,2-Dichloroethylenes 0.32 LT Chloroform 0.24 LT 1,2-Dichloroethane 0.32 LT 1,1-Trichloroethane 0.2 LT Carbon Tetrachloride 0.31 LT Bromodichloromethane 0.2 LT 1,2-Dichloropropane 0.53 LT	•
Methylene Chloride 4.4 LT 1,1-Dichloroethene 0.27 LT 1,1-Dichloroethane 0.49 LT 1,2-Dichloroethylenes 0.32 LT Chloroform 0.24 LT 1,2-Dichloroethane 0.32 LT 1,1-Trichloroethane 0.2 LT Carbon Tetrachloride 0.31 LT Bromodichloromethane 0.2 LT 1,2-Dichloropropane 0.53 LT	-
1,1-Dichloroethene 0.27 LT 1,1-Dichloroethane 0.49 LT 1,2-Dichloroethylenes 0.32 LT Chloroform 0.24 LT 1,2-Dichloroethane 0.32 LT 1,1,1-Trichloroethane 0.2 LT Carbon Tetrachloride 0.31 LT Bromodichloromethane 0.2 LT 1,2-Dichloropropane 0.53 LT	
1,1-Dichloroethane 0.49 LT 1,2-Dichloroethylenes 0.32 LT Chloroform 0.24 LT 1,2-Dichloroethane 0.32 LT 1,1,1-Trichloroethane 0.2 LT Carbon Tetrachloride 0.31 LT Bromodichloromethane 0.2 LT 1,2-Dichloropropane 0.53 LT	
1,2-Dichloroethylenes 0.32 LT Chloroform 0.24 LT 1,2-Dichloroethane 0.32 LT 1,1,1-Trichloroethane 0.2 LT Carbon Tetrachloride 0.31 LT Bromodichloromethane 0.2 LT 1,2-Dichloropropane 0.53 LT	
Chloroform 0.24 LT 1,2-Dichloroethane 0.32 LT 1,1,1-Trichloroethane 0.2 LT Carbon Tetrachloride 0.31 LT Bromodichloromethane 0.2 LT 1,2-Dichloropropane 0.53 LT	
1,2-Dichloroethane 0.32 LT 1,1,1-Trichloroethane 0,2 LT Carbon Tetrachloride 0.31 LT Bromodichloromethane 0.2 LT 1,2-Dichloropropane 0.53 LT	
Carbon Tetrachloride 0.31 LT Bromodichloromethane 0.2 LT 1,2-Dichloropropane 0.53 LT	
Bromodichloromethane 0.2 LT 1,2-Dichloropropane 0.53 LT	Γ
1,2-Dichloropropane 0.53 LT	ſ
1,2-Dichloropropane 0.53 LT Trichloroethene 0.23 LT	Γ
Inchloroethene I 0.23 Li	
1,3-Dichloropropane 0.2 LT	
Dibromochloromethane 0.25 LT	
1,1,2-Trichloroethane 0.33 LT	
(2-Chloroethoxy) Ethene 0.5 LT Bromoform 0.2 LT	
1,1,2,2-Tetrachloroethane 0.2 LT Tetrachloroethene 0.16 LT	
Carbon Disulfide 0.6 ND	
Cis-1,3-Dichloropropene 0.6 ND	
Trans-1,3-Dichloropropene 0.6 ND	
WATER SOLUBLE Acetone 3.3 LT	_
2-Butanone 4.3 LT 4-Methyl-2-Pentanone 0.63 LT	
2-Hexanone 1 NC	
OTHER	
Acrylonitrile 2 LT	
Trichlorofluoromethane 0.23 LT	
Vinyl Acetate 1 ND	
TOTAL VOCs 0	
TOTAL PETROLEUM HYDROCARBONS (ug/g) 2 LT	D

Collection Date:	29-Jan-93
Extraction Date:	05-Feb-93
Analysis Date:	09-Feb-93

lotes: (1) LT - less than detection limit; ND - not detected

TABLE HHA-2: Volatile Organic Compounds and Petroleum Hydrocarbons in Ground Water from the HHA Fort George G. Meade, Maryland Page 1 of 1

Site ID Field Sample ID Site Type Screen Start Depth (ft bgs) Screen End Depth (ft bgs) Media Total/Dissolved QC Type	HHA-6 H1M0006Y WELL 7 17 CGW Total	HHAME-1 H1ME001Y WELL 7 17 CGW Total	HHAME-2 H1ME002Y WELL 7 17 CGW Total	HHAME-3 H1ME003Y WELL 9 19 CGW Total	HHAME-4 H1ME004Y WELL 35 45 CGW Total	HHAME-5 H1ME005Y WELL 8 18 CGW Total
VOLATILE ORGANIC COMPOUNDS (ug/L)						
AROMATICS						
Benzene Toluene Ethylbenzene m-Xylene Xylenes Styrene	1 LI 1 LT 1 LT 1 LT 2 LT 5 ND	1 LI 1 LT 1 LT 1 LT 2 LT 5 ND	1 LI 1 LT 1 LT 1 LT 2 LT 5 ND	1 LI 1 LT 1 LT 1 LT 2 LT 5 ND	1 LI 1 LT 1 LT 1 LT 2 LT 5 ND	1 LI 1 LT 1 LT 1 LT 2 LT 5 ND
CHLORINATED AROMATICS				1.11	1 []	1 [1
Chlorobenzene 1,3-Dichlorobenzene Dichlorobenzene, nonspecific	1 LT 1 LT 2 LT	1 LT 1 LT 2 LT	1 LT 1 LT 2 LT	1 LT 2 LT	1 LT 2 LT	1 LT 2 LT
HALOGENATED ORGANICS						40.17
Chloromethane Bromomethane Vinyl Chloride Chloroethane Methylene Chloride 1,1-Dichloroethene 1,2-Dichloroethene 1,2-Dichloroethylenes (cis and trans isomers) Chloroform 1,2-Dichloroethane 1,2-Dichloroethane Carbon Tetrachloride Bromodichloromethane 1,2-Dichloropropane Trichloroethene 1,3-Dichloropropane Ditromochloromethane 1,1-2-Tirchloroethane 2-Chloroethylinyl Ether Bromoform 1,1-2-Tetrachloroethane 1,1-2-Tetrachloroethane 1-2-Dichloropropane Ditromochloromethane 1,2-Tetrachloroethane 1-2-Tetrachloroethane 1-2-Tetrachloroethane 1-2-Tetrachloroethene Carbon Disulfide	1.2 LT 14 LT 12 LT 8 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1	1.2 LT 14 LT 12 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1	1.2 LT 14 LT 18 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1	1.2 LT 14 LT 12 LT 8 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1	1.2 LT 14 LT 12 LT 8 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1	1.2 LT 14 LT 12 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1
cis-1,3-Dichloropropene trans-1,3-Dichloropropene	5 ND 5 ND	5 ND 5 ND	5 ND 5 ND	5 ND 5 ND	5 ND	5 NO
WATER SOLUBLES Acetone	8 LT	8 LT	8 LT	8 LT	8 LT	8 LT
2-Butanone 4-Methyl-2-Pentanone 2-Hexanone	10 LT 1.4 LT 1 ND	10 LT 1.4 LT 1 ND	10 LT 1.4 LT 1 ND	10 LT 1.4 LT 1 ND	10 LT 1.4 LT 1 N D	10 LT 1.4 LT 1 N D
OTHER						
Acryonitrile Trichlorofluoromethane Vinyl Acetate	8.4 LI 1 LT 1 ND	8.4 LT 1 LT 1 ND	8.4 LT 1 LT 1 ND	8.4 LT 1 LT 1 ND	8.4 LT 1 LT 1 ND	8.4 LI 1 LT 1 ND
TOTAL VOC	0	0	0	0	0	0
TOTAL PETROLEUM HYDROCARBONS Collection Date	100 LT 20-Jan-94	25000 20-Jan-94	100 LT 20-Jan-94	3700 20-Jan-94	100 LT 20-Jan-94	100 LT 20-Jan-94
Collection Date Extraction Date Analysis Date Notes:	26-Jan-94 26-Jan-94 26-Jan-94	26-Jan-94 26-Jan-94	26-Jan-94 26-Jan-94	26-Jan-94 26-Jan-94	26-Jan-94 26-Jan-94	26-Jan-94 26-Jan-94

Notes:
(1) LT - less than detection limit; ND - not detected
(2) It bgs - feet below ground surface
(3) Sample depths assume a 10-foot screen (well construction information not available)

TABLE HHA-3: Semivolatile Organic Compounds in Ground Water from the HHA Fort George G. Meade, Maryland Table 1 of 2

IID od Sample ID Site Type	HHA-6 H1M0006Y WELL	HHAME-1 H1ME001Y WELL	HHAME-2 H1ME002Y WELL	HHAME-3 H1ME003Y WELL	HHAME-4 H1ME004Y WELL	HHAME-5 H1ME005Y WELL
Screen Start Depth (ft bgs) Screen End Depth (ft bgs)	7 17	7 17	7 17	9 19	35 45	8 18
Media QC Type	CGW	CGW	CGW	CGW	CGW	CGW
SEMIVOLATILE ORGANIC COMPOUNCS (ug/L)						
CHLORINATED MONOCYCLIC AROMATICS	3.4 LT	3.4 LT	3,4 LT	3.4 LT	3,4 LT	3.4 LT
1,3-Dichlorobenzene 1,4-Dichlorobenzene	1.5 LT	1.5 LT	1.5 LT 1.2 LT	1.5 LT 1.2 LT	1.5 LT 1.2 LT	1.5 LT 1.2 LT
1,2-Dichlorobenzene 1,2,4-Trichlorobenzene	1.2 LT 2.4 LT	1.2 LT 2.4 LT	2.4 LT	2.4 LT	2.4 LT	2.4 LT
1,2,3-Trichlorobenzene Hexachlorobenzene	5.8 LT 12 LT	5.8 LT 12 LT	5.8 LT 12 LT	5.8 LT 12 LT	5.8 LT 12 LT	5.8 LT 12 LT
NITROSAMINES	9.7 LT	9,7 LT	9.7 LT	9.7 LT	9.7 LT	9.7 LT
N-Nitroso dimethylamine N-Nitroso-Di-n-Propylamine	6.8 LT	6.8 LT	6.8 LT	6.8 LT	6.8 LT	6.8 LT
N-Nitroso diphenylamine	3.7 LT	3.7 LT	3.7 LT	3.7 LT	3.7 LT	3.7 LT
NITROMONOCYCLIC AROMATICS Nitrobenzene	3,7 LT	3.7 LT	3.7 LT	3.7 LT	3,7 LT	3.7 LT
3-Nitrotoluene	2.9 LT	2.9 LT	2.9 LT	2.9 LT	2.9 LT	2.9 LT
2,6-Dinitrotoluene 2,4-Dinitrotoluene	6.7 LT 5.8 LT	6.7 LT 5.8 LT	6.7 LT 5.8 LT	6.7 LT 5.8 LT	6.7 LT 5.8 LT	6.7 LT 5.8 LT
PHENOLS Phenoi	22 LI	2.2 L1	22 LI	22 LI	2.2 LI	22 LI
2-Chlorophenol	2.8 LT	2.8 LT	2.8 LT	2.8 LT	2.8 LT	2.8 LT
2-Methyl Phenol	3.6 LT	3.6 LT	3.6 LT	3.6 LT	3.6 LT	3.6 LT
4-Methyl Phenol	2.8 LT	2.8 LT	2.8 LT	2.8 LT	2.8 LT	2.8 LT
2-Nitrophenol 2,4-Dimethylphenol	8.2 LT 4.4 LT	8.2 LT 4.4 LT	8.2 LT 4.4 LT	8.2 LT 4.4 LT	8.2 LT 4.4 LT	8.2 LT 4.4 LT
2,4-Dichlorophenol	8.4 LT	8.4 LT	8.4 LT	8.4 LT	8.4 LT	8.4 LT
p-Chloro-m-cresol (4-Chloro-3-methylphenol)	8.5 LT	8.5 LT	8.5 LT	8.5 LT	8.5 LT	8.5 LT
2,4,6-Trichlorophenol	3.6 LT	3.6 LT	3.6 LT	3.6 LT	3.6 LT	3.6 L1
2,4,5-Trichlorophenol 2,3,6-Trichlorophenol	2.8 LT 1.7 LT	2.8 LT 1.7 LT	2.8 LT 1.7 LT	2.8 LT 1.7 LT	2.8 LT 1.7 LT	2.8 LT 1.7 LT
Dinitrophenol	180 LT	180 LT	180 LT	180 LT	180 LT	180 LT
trophenol	96 LT	96 LT	96 LT	96 LT	96 LT	96 LT
Methyl-4,6-Dinitrophenol	50 NC		50 ND	50 ND	50 ND	50 N
Dibenzofuran Pentachlorophenol	5.1 LT 9.1 LT	5.1 LT 9.1 LT	5.1 LT 9.1 LT	5.1 LT 9.1 LT	5.1 LT 9.1 LT	5.1 LT 9.1 LT
PHOSPHOROUS CONTAINING Dimethyl methylphosphonate	130 LI	130 LI	130 LT	130 E1	130 LT	130 L
Diisopropyl methylphosphonate	21 LT	21 LT	21 LT	21 LT	21 LT	21 LT
PCB's						
PCB-1016 PCB-1221	9.1 NC 9.1 NC		9.1 ND 9.1 ND		9.1 ND 9.1 ND	9.1 N 9.1 N
PCB-1232	9.1 NE		9.1 ND		9.1 ND	9.1 N
PCB-1242	9.1 NC		9.1 ND		9.1 ND	9.1 N
PCB-1248	9.1 ND		9.1 ND		9.1 ND	9.1 N
PCB-1254 PCB-1260	9.1 NC 13 NC		9.1 ND 13 ND		9,1 ND 13 ND	9.1 N 13 N
PHTHALATES Dimethyl Phthalate	2.2 L1	2.2 LI	2.2 [1	22 [1	2.2 LI	2.2 L
Diethyl Phthalate	5.9 LT	5.9 LT	5.9 LT	5.9 LT	5.9 LT	5.9 L
Di-n-butyl Phthalate	33 LT	33 LT	33 LT	33 LT	33 LT	33 L
Butyl Benzyl Phthalate	28 LT	28 LT	28 LT	28 LT	28 LT	28 L
Bis (2-Ethyl hexyl) Phthalate Di-n-octyl Phthalate	7.7 LT 1.5 LT	7.7 LT 1.5 LT	7.7 LT 1.5 LT	7.7 LT 1.5 LT	48 1.5 LT	7.7 LT 1.5 LT
POLYNUCLEAR AROMATICS Naphthalene	0.5 L1	0.5 LT	0.5 LT	0.5 LI	0.5 LI	0.5 L1
2-Methylnaphthalene 2-Chloronaphthalene	1.3 LT 2.6 LT	120 2.6 LT	1.3 LT 2.6 LT	28 2.6 LT	1.3 LT 2.6 LT	1.3 LT 2.6 LT
2-Chloronaphinalene Acenaphthylene	2.6 LT 5.1 LT	5.1 LT	2.6 LT	2.6 L1 5.1 LT	2.6 LT	2.6 L 5.1 L
Acenaphthene	5.8 LT	5.8 LT	5.8 LT	5.8 LT	5.8 LT	5.8 L
Fluorene	9.2 LT	9.2 LT	9.2 LT	9.2 LT	9.2 LT	9.2 L
Phenanthrene	9.9 LT	9.9 LT	9.9 LT	9.9 LT	9.9 LT	9.9 L
Anthracene Fluoranthrene	5.2 LT 24 LT	5.2 LT 24 LT	5.2 LT 24 LT	5.2 LT 24 LT	5.2 LT 24 LT	5.2 LT 24 LT
-luoranthrene Pyrene	17 LT	17 LT	17 LT	17 LT	17 LT	17 LT

Notes:
(1) LT - less than detection limit; ND - not detected
(2) ft bgs - feet below ground surface
(2) Sample depths assume a 10-foot screen (well construction information not available)

TABLE HHA-3: Semivolatile Organic Compounds in Ground Water from the HHA Fort George G. Meade, Maryland Page 2 of 2

Page 2 of 2	T HHA-6	I HHAME-1	HHAME-2	H-IAME-3	HHAME-4	HHAME-5
Site ID Field Sample ID	H1M0006Y	H1ME001Y	H1ME002Y WELL	H1ME003Y WELL	H1ME004Y WELL	H1ME005Y WELL
Site Type Screen Start Depth (ft bgs)	WELL.	WELL 7	7	9	35	8
Screen End Depth (It bgs)	17	17	17	19	45 CGW	18 CGW
Media OC Turns	CGW	cgw	CGW	cgw	CGW	CGW
QC Type						
POLYNUCLEAR AROMATICS Benzo (a) Anthracene	9.8 LT	9.8 LT	9.8 LT	9.8 LT	9.8 LT	9.8 L1
Chrysene	7.4 LT	7.4 LT	7.4 LT	7.4 LT	7.4 LT	7.4 LT
Benzo (b) Fluoranthene	10 LT 10 LT	10 LT 10 LT	10 LT 10 LT	10 LT 10 LT	10 LT 10 LT	10 LT 10 LT
Benzo (k) Fluoranthene Benzo (a) Pyrene	14 LT	14 LT	14 LT	14 LT	14 LT	14 LT
Indeno (1,2,3,cd) Pyrene	21 LT	21 LT	21 LT	21 LT	21 LT 12 LT	21 LT 12 LT
Dibenzo (a,h) Anthracene Benzo (ghi) Perylene	12 LT 15 LT	12 LT 15 LT	12 LT 15 LT	12 LT 15 LT	12 LT 15 LT	15 LT
	""	'0 -/				
PESTICIDES Alpha-BHC	5.3 LT	5.3 LT	5.3 LT	5.3 LT	5.3 LT	5.3 LT
Beta-BHC	17 LT	17 LT	17 LT	17 LT	17 LT	17 LT
Atrazine	5.9 LT	5.9 LT	5.9 LT 7.2 LT	5.9 LT 7.2 LT	5.9 LT 7.2 LT	5.9 LT 7.2 LT
Lindane (g-BHC) Delta-BHC	7.2 LT 3 ND	7.2 LT 3 ND	3 ND	3 ND	3 ND	3 ND
Heptachlor	38 LT	38 LT	38 LT	38 LT	38 LT	38 LT
Bromacil	2.9 LT	2.9 LT	2.9 LT	2.9 LT	2.9 LT	2.9 LT
Malathion	21 LT 37 LT	21 LT 37 LT	21 LT 37 LT	21 LT 37 LT	21 LT 37 LT	21 LT 37 LT
Parathion Aldrin	13 LT	13 LT	13 LT	13 LT	13 LT	13 LT
Supona	19 LT	19 LT	19 LT	19 LT	19 LT	19 LT 7.8 LT
Isodrin	7.8 LT 28 LT	7.8 LT 28 LT	7.8 LT 28 LT	7.8 LT 28 LT	7.8 LT 28 LT	7.8 LT 28 LT
Heptachlor Epoxide Chlordane	28 LT 37 LT	37 LT	37 LT	37 LT	37 LT	37 LT
Vaporia	8.5 LT	8.5 LT	8.5 LT	8.5 LT	8.5 LT	8.5 LT
Endosulfan I	23 LT 14 LT	23 LT 14 LT	23 LT 14 LT	23 LT 14 LT	23 LT 14 LT	23 LT 14 LT
4,4'DDE Dieldrin	26 LT	26 LT	26 LT	26 LT	26 LT	26 LT
Endrin Aldehyde	5 LT	5 LT	5 LT 18 LT	5 LT 18 LT	5 LT 18 LT	5 LT 18 LT
Endrine 4,4'-DDD	18 LT	18 18 LT	18 LT 18 LT	18 LT	18 LT	18 LT
Endosulfan II	42 LT	42 LT	42 LT	42 LT	42 LT	42 LT
4,4DDT	18 LT	18 LT 50 LT	18 LT 50 LT	18 LT 50 LT	18 LT 50 LT	18 LT 50 LT
Endosulfan Sulfate Methoxychlor	50 LT 11 LT	50 LT 11 LT	11 LT	11 LT	וֹז נֹדֹ	ĩĩ LT
Mirex	24 LT	24 LT	24 LT	24 LT	24 LT	24 LT
Endrine Ketone Toxaphene	6 ND 17 ND	6 ND 17 ND	6 ND 17 ND	6 ND 17 ND	6 ND 17 ND	6 ND 17 ND
p-Chlorophenylmethyl Sulfoxide	15 LT	15 LT	15 LT	15 LT	15 LT	15 LT
p-Chlorophenýlmethýl Sulfide 4-Chlorophenylmethyl Sulfone	10 LT 5.3 LT	10 LT 5.3 LT	10 LT 5.3 LT	10 LT 5,3 LT	10 LT 5.3 LT	10 LT 5.3 LT
	0.5 2.	5.5 2.	5.0			
OTHER 1.4-Oxathaine (Thioxane)	27 LT	27 LT	27 LT	27 LT	27 LT	27 LT
Bis (2-Chloroethyl) Ether	0.68 LT	0.68 LT	0.68 LT	0.68 LT	0.68 LT 5.5 LT	0.68 LT 5.5 LT
Dicyclopentadiene Benzyl Alcohol	5.5 LT 4 LT	5.5 LT	5.5 LT 4 LT	5.5 LT 4 LT	4 LT	4 LT
Bis (2-Chloroisopropyl) Ether	5 LT	s lit	5 LT	5 LT	5 LT	5 LT
Dithiane	3.3 LT	3.3 LT	3.3 LT 8.3 LT	3.3 LT 8.3 LT	3.3 LT 8.3 LT	3.3 LT 8.3 LT
Hexachloroethane Dibromochloropropane	8.3 LT 12 LT	8.3 LT 12 LT	8.3 LT 12 LT	12 LT	12 LT	12 LT
Isophorone	2.4 LT	2.4 LT	2.4 LT	2.4 LT	2.4 LT	2.4 LT
Bis (2-Chloroethoxy) Methane	6.8 LT	6.8 LT	6.8 LT	6.8 LT	6.8 LT	6.8 LT 3.1 ND
Benzoic Acid 4-Chloroaniline	3.1 ND 1 ND	3.1 ND 1 ND	3.1 ND 1 ND	3.1 ND 1 ND	3.1 ND 1 ND	3.1 ND 1 ND
4-Critoroamine Hexachlorobutadiene	8.7 LT	8.7 LT	8.7 LT	8.7 LT	8.7 LT	8.7 LT
2-Nitroniline	31 ND	31 ND	31 ND	31 ND 15 LT	31 ND 15 LT	31 ND 15 LT
3-Nitroaniline 4-Nitroaniline	15 LT 31 ND	15 LT 31 ND	15 LT 31 ND	15 LT 31 ND	31 ND	31 ND
4-Chlorophenyl Phenyl Ether	23 LT	23 LT	23 LT	23 LT	23 LT	23 LT
1,2-Diphenyl Hydrazine	13 LT	13 LT	13 LT	13 LT	13 LT	13 LT
		8.8 LT	8.8 LT	8.8 LT 22 LT	8.8 LT 22 LT	8.8 LT 22 LT
2,6-Dinitroaniline	8.8 LT		//			
	8.8 LT 22 LT 21 LT	22 LT 21 LT	22 LT 21 LT	21 LT	21 LT	21 LT
2,6-Dinitroaniline 4-Bromophenyl Phenyl Ether 3,5-Dinitroaniline Hexachlorocyclopentadiene	22 LT 21 LT 54 LT	22 LT 21 LT 54 LT	21 LT	21 LT 54 LT	21 LT 54 LT	21 LT 54 LT
2,6-Dinitroaniline 4-Bromophenyl Phenyl Ether 3,5-Dinitroaniline Hexachlorocyclopentadiene 3,3'-Dichlorobenzidine	22 LT 21 LT 54 LT 5 LT	22 LT 21 LT 54 LT 5 LT	21 LT 54 LT 5 LT	21 LT 54 LT 5 LT	21 LT 54 LT 5 LT	21 LT 54 LT 5 LT
2,6-Dinitroaniline 4-Bromophenyl Phenyl Ether 3,5-Dinitroaniline Hexachlorocyclopentadiene 3,3'-Dichlorobenzidine TOTAL SVOC	22 LT 21 LT 54 LT	22 LT 21 LT 54 LT	21 LT	21 LT 54 LT	21 LT 54 LT	21 LT 54 LT 5 LT 0 20-Jan-94
2,6-Dinitroaniline 4-Bromophenyl Phenyl Ether 3,5-Dinitroaniline Hexachlorocyclopentadiene 3,3'-Dichlorobenzidine	22 LT 21 LT 54 LT 5 LT	22 LT 21 LT 54 LT 5 LT	21 LT 54 LT 5 LT	21 LT 54 LT 5 LT 28	21 LT 54 LT 5 LT 48	21 LT 54 LT 5 LT 0

Notes:
(1) LT - less than detection limit; ND - not detected
(2) ft bgs - feet below ground surface
(3) Sample depths assume a 10-foot screen (well construction information not available)

TABLE HHA4: Metals Data for Ground Water from the HHA Fort George G. Meade, Maryland Page 1 of 2

Site Type	H1M0006Y UB00466 WELL	H1M0006Z UB00467 WELL	H1ME001Y UB00472 WELL	HHAME-1 H1ME001Z UB00473 WELL	HHAME-2 H1ME002Y UB00464 WELL	HHAME-2 H1ME002Z UB00465 WELL	HHAME-3 H1ME003Y UB00474 WELL	HHAME-3 H1ME003Z UB00475 WELL
Screen Start Depth (ft bgs) Screen End Depth (ft bgs) Total/Dissolved OC Type	7 17 Total	7 17 Dissolved	7 17 Total	7 17 Dissolved	7 17 Total	7 17 Dissolved	19 Total	19 Dissolved
METALS (ug/L)								
Aluminum	2590		535		2950	-		_
Antimony	60 LT	8 1	88	60 LT		86 LT	8 1	68 LT
Arsenic	9.36 58.55	15.2 42.4	9.91	14.6 36				
Beryllium		_	_			_	_	_
Boron Cadmium	230	230 LT 6.78 LT	230 LT 6.78 LT	230 LT	230 LT 6.78 LT	230 LT	230 LT	230 LT
Calcium			-		•	•	-	_
Chromium		16.8 LT	16.8 LT	16.8 LT			16.8 LT	_
Cobait	25 LT		_		25 LT	25 LT	25 LT	₩,
lion	36700	_	45600		31900	_	18.8 26600	
Lead	17.6	14.5	7.79	4.47 LT	12.9	4.47 LT	4.47 LT	4.47 LT
Manganese	286	874	1480	1390	8 4	959	3100	30/0
Mercury	0.1 5.7	0.1 1.1 1.1	0.1 LT	0.1 LT	_	0.1 LT	0.1 1.1	0.1 LT
Nickel				_	52.7 LI			
Potassium	_		-	_	_	_	_	_
Selenium	2.53 LT	2.53 LT	2.53 LT	2.53 LT	2.53 LT	2.53 LT	2.53 LT	2.53 LT
Sodium	8970		_	_	_			_
Tellurium					_	_		_
Tin	17 693 17 693 11 693				125 L1 59.9 LT	125 LT		
Vanadium		27.6 LT	27.6 LT	27.6 LT		_	27.6 LT	27.6 LT
ZINC	8./4		_	_	18 LT	26.8	_	_
Heavy Metals Grand Total Metals	50 142828	30 123336	17 104860	15 87271	121 55781	11 25245	14 64018	11
Collection Date Extraction Date	20-Jan-94 13-Feb-94	20-Jan-94 13-Feb-94	20-Jan-94 13-Feb-94	20-Jan-94 13-Eah-04	20-Jan-94	20-Jan-94	20-Jan-94	20-Jan-94
Analysis Date	13-Feb-94	13-Feb-94	13-Feb-94	13-Feb-94	13-Feb-94	13-Feb-94	13-Feb-04	12 Feb 94

10.17.-(1) LT.- less than detection limit; ND - not detected (2) ft bgs - feet below ground surface (3) Heavy metals include Sb,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag (4) Sample depths assume a 10-foot screen (well construction information not available)

TABLE HHA-4: Metals Data for Ground Water from the HHA Fort George G. Meade, Maryland Page 2 of 2

Field Sample ID	H1ME004Y	HHAME4 H1ME004Z	H1ME005Y	HHAME-5 H1ME006Z
Lab Sample ID Site Type Screen Start Deoth (# bos)	UB00476 WELL	UB00477 WELL	UB00470 WELL	UB00471 WELL
Screen End Depth (it bgs) Total/Dissolved QC Type	45 Total	45 Dissolved	18 Total	18 Dissolved
METALS (ug/L)				
Aluminum	11900	112 LT	2030	112 IT
Antimony	17 09 LT	59.7	60 LT	9
Arsenic Barium	45.3	2.35 LT	270	4.69
Beryllium	1.24	1.12	1.12 LT	
Boron Cadmium	230 LT	230 LT	230 LT	230
Caldium	96200		57200	
Chromium	216			_
Sobalt	82.2		25 LT	25 LT
Copper	3/5 186000	18.8 LT	18.8 LT	18.8 LT
ead	022		40.1	4 47 17
Magnesium	16800		6840	
Manganese	1300	117		
verculy Jobbponim	0.918 52.7 LT	0.221	0.1 53.7	0.1 [5.7]
Nickel				
Potassium	8260	0859		7450
Selenium			2.53 LT	2.53 LT
Sodium	1,050	10801		10 LT
Fellurium		118		_
hallium	125 LT	125 LT	125 LT	
· •		59.9		
Vanadium Zinc	2820	27.6 LT 137	27.6 LT 216	27.6 LT 18 LT
Heavy Metals Grand Total Metals	347314	60	346	5
Collection Date	20-Jan-94	20-Jan-94	20-Jan-94	20-Jan-94
	1000101	100000	50-00-1-0	13-140-34

Notes:
(1) LT - less than detection limit; ND - not detected
(2) ft bgs - feet below ground surface
(3) Heavy metals include Sb, As, Be, Cd, Cr, Pb, Hg, Ni, Se, Ag
(4) Sample depths assume a 10-foot screen (well construction information not available)

TABLE HHA-5: Volatile Organic Compounds in Surface Water from the HHA Fort George G. Meade, Maryland ge 1 of 1

Site ID Field Sample ID Site Type Start Depth (ft bgs) End Depth (ft bgs)	HHASW-1 H1T0001A STRM 0 0.5	HHASW-2 H1T0002A STRM 0 0.5	HHASW-3 H1T0003A STRM 0 0.5	HHASW-4 H1T0004Y STRM 0 0.5	HHASW-5 H1T0005Y STRM 0 0.5
Media Total/Dissolved QC Type	CSW Total	CSW Total	CSW Total	CSW Total	CSW Total
VOLATILE ORGANIC COMPOUNDS (ug/L)					
AROMATICS					
Benzene	1 LT				
Toluene	1 년	1 LT 1 LT	1 LT 1 LT	1 LT	1 LT 1 LT
Ethylbenzene m-Xylene	iti	iti	iti	iti	itt
Xylenes	2 LT	2 LT			2 LT 5 ND
Styrene	5 ND	5 ND	2 LT 5 ND	2 LT 5 ND	5 ND
CHLORINATED AROMATICS				1 LT	1 17
Chlorobenzene	1 LT 1 LT	1 LT 1 LT	1 LT	i LT	1 17
1,3-Dichlorobenzene Dichlorobenzene, nonspecific	ב בד	2 LT	ż LT	ż ĽŤ	ב בד
Did Notoce 2016, For Specific	2 61			,	
HALOGENATED ORGANICS					
Chloromethane	1.2 LT				
Bromomethane	14 LT	14 LT 12 LT	14 LT 12 LT	14 LT 12 LT	14 LT 12 LT
Vinyl Chloride Chloroethane	12 LT 8 LT	8 LT	12 LT 8 LT	8 LT	8 17
Methylene Chloride	1 LT	1 LT	1 LT	1 LT	ı LT
1,1-Dichloroethene	i Lt	i Lt	i ĽŤ	i Lt	i ĽŤ
1.1-Dichloroethane	i LT	1 LT	1 LT	1 LT	1 LT
1,2-Dichloroethylenes (cis and trans isomers)	5 LT				
Chloroform	1 LT				
1,2-Dichloroethane	1 [1]	1 11	1 1	1 LT	1 LŢ
1-Trichloroethane	1 LT	1 LT	1 LT	1 1	1 LT
bon Tetrachloride	1 LT	1 LT	1 LT 1 LT	1 LT	1 년
Bromodichloromethane 1,2-Dichloropropane	1 LT	i Li	iti	i ti	l iti
Trichloroethene	i LT				
1,3-Dichloropropane	4.8 LT				
Dibromochloromethane	1 LT				
1,1,2-Trichloroethane	1 LT	1 LT	i LT	1 LT	1 LT
2-Chloroethylvinyl Ether	3.5 LT				
Bromoform	11 LT				
1,1,2,2-Tetrachloroethane	1.5 LT	1.5 LT	1.5 LT 1 LT	1.5 LT 1 LT	1.5 LT 1 LT
Tetrachloroethene Carbon Disulfide	1 LT 5 ND	5 ND	1 LT 5 ND	1 LT 5 ND	5 ND
cis-1,3-Dichloropropene	5 ND				
trans-1,3-Dichloropropene	5 ND				
WATER SOLUBLES					
Acetone 2-Butanone	8 LT 10 LT				
4-Methyl-2-Pentanone	1.4 LT				
2-Hexanone	1 ND				
OTHER		V_		0	0
Acrylonitrile	8.4 LT				
Trichlorofluoromethane	1 LT	1 LT	1 LT	1 LT	1 11
Vinyl Acetate	1 ND				
TOTAL VOC	0	0	0	0	0
TOTAL PETROLEUM HYDROCARBONS (ug/L)	100 LT				
Collection Date	21-Jan-94	21-Jan-94	21-Jan-94	21-Jan-94	21-Jan-94
Extraction Date	27-Jan-94	27-Jan-94	27-Jan-94	27-Jan-94	27-Jan-94
Analysis Date	27-Jan-94	27-Jan-94	27-Jan-94	27-Jan-94	27-Jan-94

Notes:
(1) LT - less than detection limit; ND - not detected
(2) It bgs - feet below ground surface
leavy metals include Sb,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag
Sample depths assume a 10-foot screen (well construction information not available)

TABLE HHA-6: Semivolatile Organic Compounds in Surface Water from the HHA Fort George G. Meade, Maryland Page 1 of 2

Site ID	HHASW-1 STRM	HHASW-2 STRM	HHASW-3 STRM	HHASW-4 STRM	HHASW-5 STRM
Site Type	H1T0001A	H1T0002A	H1T0003A	H1T0004Y	H1T0005Y
Field Sample ID		0	0	0	0
Start Depth (ft bgs)	0		0.5	0.5	0.5
End Depth (ft bgs)	0.5	0.5			CSW
Media	CSW	CSW	CSW	CSW	
Total/Dissolved	Total	Total	Total	Total	Total
QC Type					
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L					
CHLORINATED MONOCYCLIC AROMATICS	3.4 LI	3.4 L1	3.4 LT	3.4 L1	3.4 LT
1,3-Dichlorobenzene		1.5 LT	1.5 LT	1.5 LT	1.5 LT
1,4-Dichlorobenzene	1.5 LT 1.2 LT	12 LT	1.2 LT	1.2 LT	1.2 LT
1,2-Dichlorobenzene		2.4 LT	2.4 LT	2.4 LT	2.4 LT
1,2,4-Trichlorobenzene			5.8 LT	5.8 LT	5.8 LT
1,2,3-Trichlorobenzene	5.8 LT	5.8 LT	12 LT	12 LT	12 LT
Hexachlorobenzene	12 LT	12 LT	12 L1	12 61	,,, ,,
NITROSAMINES	9.7 L1	9,7 L1	9.7 LT	9.7 LI	9,7 LT
N-Nitroso dimethylamine				6.8 LT	6.8 LT
N-Nitroso-Di-n-Propylamine N-Nitroso diphenylamine	6.8 LT 3.7 LT	6.8 LT 3.7 LT	6.8 LT 3.7 LT	3.7 LT	3.7 LT
NITROMONOCYCLIC AROMATICS Nitropenzene	3.7 LI	3.7 LT	3.7 L1	3.7 L1	3.7 LT
	2.9 LT	2.9 LT	2.9 LT	2.9 LT	2.9 LT
3-Nitrotoluene	6.7 LT	6.7 LT	6.7 LT	6.7 LT	6.7 LT
2,6-Dinitrotoluene 2,4-Dinitrotoluene	5.8 LT	5.8 LT	5.8 LT	5.8 LT	5.8 LT
·	3.0 2.				0
PHENOLS	33.11	2.2 LT	2.2 LT	2.2 LT	22 LT
Phenol	2.2 LT 2.8 LT	2.2 L1 2.8 LT	2.2 LT 2.8 LT	2.8 LT	2.8 LT
2-Chlorophenol	2.8 LT 3.6 LT	3.6 LT	3.6 LT	3.6 LT	3.6 LT
2-Methyl Phenol				2.8 LT	2.8 LT
4-Methyl Phenol	2.8 LT	2.8 LT	2.8 LT 8.2 LT	8.2 LT	8.2 LT
2-Nitrophenol	8.2 LT	8.2 LT			4.4 LT
2,4-Dimethylphenol	4.4 LT	4.4 LT	4.4 LT	4.4 LT	8.4 LT
2,4-Dichlorophenol	8.4 LT	8.4 LT	8.4 LT	8.4 LT	
p-Chloro-m-cresol (4-Chloro-3-methylphenol)	8.5 LT	8.5 LT	8.5 LT	8.5 LT	
2,4,6-Trichlorophenol	3.6 LT	3.6 LT	3.6 LT	3.6 LT	3.6 LT
2,4,5-Trichlorophenol	2.8 LT	2.8 LT	2.8 LT	2.8 LT	2.8 LT
2.3.6-Trichlorophenol	1.7 LT	1.7 LT	1.7 LT	1.7 LT	1.7 LT
2,4-Dinitrophenol	180 LT	180 LT	180 LT	180 LT	180 LT
4-Nitrophenol	96 LT	96 LT	96 LT	96 LT	96 LT
Methyl-4,6-Dinitrophenol	50 ND	50 ND	50 ND	50 ND	50 ND
Dibenzofuran	5.1 LT	5.1 LT	5.1 LT	5.1 LT	5.1 LT
Pentachiorophenol	9.1 LT	9.1 LT	9.1 LT	9.1 LT	9.1 LT
PHOSPHOROUS CONTAINING					_
Dimethyl methylphosphonate	130 LT	130 LT	130 LT	130 LT	130 LT
Diisopropyl methylphosphonate	21 LT	21 LT	21 LT	21 LT	21 LT
PCB's				9.1 ND	9.1 ND
PCB-1016	9.1 ND	9.1 ND	9.1 ND	9.1 ND 9.1 ND	9.1 ND
PCB-1221	9.1 ND	9.1 ND	9.1 ND		9.1 ND
PCB-1232	9.1 ND	9.1 ND	9.1 ND	9.1 ND	
PCB-1242	9.1 ND	9.1 ND	9.1 ND	9.1 ND	
PCB-1248	9.1 ND	9.1 ND	9.1 ND	9.1 ND	9.1 ND
PCB-1254	9.1 ND	9.1 ND	9.1 ND	9.1 ND	9.1 ND
PCB-1260	13 ND	13 ND	13 ND	13 ND	13 ND
PHTHALATES					
Dimethyl Phthalate	2.2 LT	2.2 LT	2.2 LT	2.2 LT	2.2 LT
Diethyl Phthalate	5.9 LT	5.9 LT	5.9 LT	5.9 LT	5.9 LT
Di-n-butyl Phthalate	33 LT	33 LT	33 LT	33 LT	33 LT
Butyl Benzyl Phthalate	28 LT	28 LT	28 LT	28 LT	28 LT
Bis (2-Ethyl hexyl) Phthalate	7.7 LT	7.7 LT	7.7 LT	7.7 LT	7.7 LT
Di-n-octyl Phthalate	1.5 LT	1.5 LT	1.5 LT	1.5 LT	1.5 LT
POLYNUCLEAR AROMATICS					
Naphthalene	0.5 LT	0.5 LT	0.5 LT	0.5 LT	0.5 LT
2-Methylnaphthalene	1.3 LT	1,3 LT	1.3 LT	1.3 LT	1.3 LT
2-Chloronaphthalene	2.6 LT	2.6 LT	2.6 LT	2.6 LT	2.6 LT
Acenaphthylene	5.1 LT	5.1 LT	5.1 LT	5.1 LT	5.1 LT
Acenaphthene	5.8 LT	5.8 LT	5.8 LT	5.8 LT	5.8 LT
Fluorene	9.2 LT	9.2 LT	9.2 LT	9.2 LT	9.2 LT
Phenanthrene	9.9 LT	9.9 LT	9.9 LT	9.9 LT	9.9 LT
Anthracene	5.2 LT	5.2 LT	5.2 LT	5.2 LT	5.2 LT
Fluoranthrene	24 IT	24 LT	24 LT	24 LT	24 LT 17 LT
	17 LT	17 LT	17 LT	17 LT	17 LT

TABLE HHA-6: Semivolatile Organic Compounds in Surface Water from the HHA Fort George G. Meade, Maryland Page 2 of 2

ID table Type Field Sample ID Start Depth (ft bgs)	HHASW-1 STRM H1T0001A	HHASW-2 STRM H1T0002A	HHASW-3 STRM H1T0003A	HHASW-4 STRM H1T0004Y 0	HHASW-5 STRM H1T0005Y 0
End Depth (it bgs)	ľ		Ĭ	ď	ľ
Media	CSW	CSW	CSW	csw	CSW
Total/Dissolved QC Type	Total	Total	Total	Total	Total
POLYNUCLEAR AROMATICS					
Benzo (a) Anthracene	9.8 LT	9.8 LT	9.8 LT	9.8 L1	9.8 L1
Chrysene	7.4 LT	7.4 LT	7.4 LT	7.4 LT	7.4 LT
Benzo (b) Fluoranthene	10 LT	10 LT	10 LT	10 LT	10 LT
Benzo (k) Fluoranthene	10 LT	10 LT	10 L <u>T</u>	10 LT	10 LT
Benzo (a) Pyrene	14 LT 21 LT	14 LT 21 LT	14 LT 21 LT	14 LT 21 LT	14 LT 21 LT
Indeno (1,2,3,cd) Pyrene Dibenzo (a,h) Anthracene	12 LT	12 LT	12 LT	12 LT	12 LT
Benzo (ghi) Perylene	15 LT	15 LT	15 LT	15 LT	15 LT
PESTICIDES		1 1			
Alpha-BHC	5.3 LT	5.3 LT	5.3 LT	5.3 LT	5.3 LT
Beta-BHC	17 LT	17 LT	17 LT	17 LT	17 LT 5.9 LT
Atrazine	5.9 LT	5.9 LT	5.9 LT	5.9 LT	
Lindane (g-BHC) Delta-BHC	7.2 LT 3 ND	7.2 LT 3 ND	7.2 LT 3 ND	7.2 LT 3 ND	7.2 LT 3 ND
Heptachlor	38 LT	38 LT	38 LT	38 LT	38 LT
Bromacil	2.9 LT	2.9 LT	2.9 LT	2.9 LT	2.9 LT
Malathion	21 LT	21 LT	21 LT	21 LT	21 LT
Parathion	37 LT	37 LT	37 LT	37 LT	37 LT
Aldrin	13 LT	13 LT 19 LT	13 LT 19 LT	13 LT 19 LT	13 LT 19 LT
Supona sodrin	19 LT 7.8 LT	7.8 LT	7.8 LT	7.8 LT	7.8 LT
Heptachlor Epoxide	28 LT	28 LT	28 LT	28 LT	28 LT
Chiordane	37 LT	37 LT	37 LT	37 LT	37 LT
/apona	8.5 LT	8.5 LT	8.5 LT	8.5 LT	8.5 LT
ndosulfan I	23 LT	23 LT	23 LT	23 LT	23 LT
l,4'DDE Dieldrin	14 LT	14 LT	14 LT	14 LT	14 LT
Endrin Aldehyde	26 LT 5 LT	26 LT 5 LT	26 LT 5 LT	26 LT 5 LT	26 LT 5 LT
ndrine	18 LT	18 LT	18 LT	18 LT	18 LT
,4'-DOD	18 LT	18 LT	18 LT	18 LT	18 LT
dosulfan II	42 LT	42 LT	42 LT	42 LT	42 LT
DDT .dosulfan Sulfate	18 LT 50 LT	18 LT 50 LT	18 LT 50 LT	18 LT 50 LT	18 LT 50 LT
Methoxychlor	11 LT	11 LT	11 LT	11 LT	11 LT
Airex	24 LT	24 LT	24 LT	24 LT	l żi ĽŤ
ndrine Ketone	6 ND	6 ND	6 ND	6 ND	6 NC
oxaphene	17 ND	17 ND	17 ND	17 ND	17 NC
SULFUR CONTAINING					
-Chlorophenylmethyl Sulfoxide -Chlorophenylmethyl Sulfide	15 LT 10 LT	15 LT 10 LT	15 LT 10 LT	15 LT 10 LT	15 LT 10 LT
-Chlorophenylmethyl Sulfone	5.3 LT	5.3 LT	5.3 LT	5.3 LT	5.3 LT
OTHER					
,4-Oxathaine (Thioxane)	27 LI	27 LT	27 LT	27 L1	27 L1
lis (2-Chloroethyl) Ether	0.68 LT	0.68 LT	0.68 LT	0.68 LT	0.68 LT
icyclopentadiene	5.5 LT	5.5 LT	5.5 LT	5.5 LT	5.5 LT
enzyl Alcohol is (2-Chloroisopropyl) Ether	4 LT 5 LT	4 LT 5 LT	4 LT 5 LT	4 LT 5 LT	4 LT 5 LT
is (2-chiordisopropyr) Ether ithiane	3.3 LT	3.3 LT	3.3 LT	3.3 LT	3.3 LT
exachloroethane	8.3 LT	8.3 LT	8.3 LT	8.3 LT	8.3 LT
ibromochloropropane	12 LT	12 LT	12 LT	12 LT	12 LT
ophorone	2.4 LT	2.4 LT	2.4 LT	2.4 LT	2.4 LT
is (2-Chloroethoxy) Methane	6.8 LT	6.8 LT	6.8 LT	6.8 LT	6.8 LT
enzoic Acid Chloroaniline	3.1 ND 1 ND	3.1 ND 1 ND	3.1 ND 1 ND	3.1 ND 1 ND	3.1 NC 1 NC
exachlorobutadiene	8.7 LT	8.7 LT	8.7 LT	8.7 LT	8.7 LT
-Nitroniline	31 ND	31 ND	31 ND	31 ND	31 ND
Nitroaniline	15 LT	15 LT	15 LT	15 LT	15 LT
-Nitroaniline	31 ND	31 ND	31 ND	31 ND	31 NC
-Chlorophenyl Phenyl Ether	23 LT	23 LT	23 LT	23 LT	23 LT
2-Diphenyl Hydrazine 6-Dinitroaniline	13 LT 8.8 LT	13 LT 8.8 LT	13 LT	13 LT 8.8 LT	13 LT 8.8 LT
Bromophenyl Phenyl Ether	22 LT	22 LT	8.8 LT 22 LT	22 LT	22 LT
5-Dinitroaniline	21 LT	21 LT	21 LT	21 LT	21 LT
exachlorocyclopentadiene	54 LT	54 LT	54 LT	54 LT	54 LT
3'-Dichlorobenzidine	5 LT	5 LT	5 LT	5 LT	5 LT
OTAL SVOCS	0	0	0	0	0
ollection Date xtraction Date	21-Jan-94 27-Jan-94	21-Jan-94 27-Jan-94	21-Jan-94 27-Jan-94	21-Jan-94 27-Jan-94	21-Jan-94 27-Jan-94

7 - less than detection limit; ND - not detected
(2) ft bgs - feet below ground surface

TABLE HHA-7: Metals in Surface Water from the HHA Fort George G. Meade, Maryland Page 1 of 1

Field Sample ID Site Type Start Depth (ft bgs) End Depth (ft bgs) Media Total/Dissolved	H1T0001A STRM 0 0.5 CSW	HT0002A STRIM 0.5 CSW	H17003A STRM 0.5 CSW Total	HHASW4 H170004Y STRM 0.5 CSW Total	H170005Y STRM 0.5 CSW Total
METALS (ug/L)					
Aluminum Antimony	112 LT 60 LT	2600 60 LT	335 60 LT	349 60 LT	527 60 LT
Arsenic Barium	_	_	_	_	_
Beryllium	1.12 LT 230 LT	1.12 LT 230 LT	1.12 LT 230 LT	1.12 LT 230 LT	1.12 LT 230 LT
Cadmium		_	_	_	_
Caldum	-	_	_	_	_
Cobalt	25 17	25 17	% LI	25 LT	25 LT
Copper	_	_	_		_
Lead	4.47 LT	4.47 LT	4.47 LT	4.47 LT	4.47 LT
Magnesium	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	0140	6410 147	985	6440 163
Mercury				_	
Molybdenum	52.7 LT	52.7 LT 32.1 LT	52.7 LT 32.1 LT	52.7 LT 32.1 LT	52.7 LT
Potassium	-	•	-	-	_
Selenium	2.53 LT	2.53 LT	2.53 LT	2.53 LT	2.53 LT
Sodium	_		_	_	_
Tellurium		118 LT	148 175 175	118 LT 125 LT	118 LT
Tin			-	_	
Vanadium Zinc	27.6 LT 18 LT		27.6 LT 19.6	_	27.6 LT 24.3
Heaw Metals	c	c	o	c	o
Grand Total Metals	133453	240978	140419	139853	144068
Collection Date Extraction Date	21-Jan-94 13-Feb-94	21-Jan-94 13-Feb-94	21-Jan-94 13-Feb-94	21-Jan-94 13-Feb-94	21-Jan-94 13-Feb-94
Analysis Date	10 10 10 1	12 Ech 04	13.Esh 94	13 Fob 04	12 Feb 04

(1) LT - less than detection limit; ND - not detected (2) it bgs - feet below ground surface

TABLE HHA-8: Volatile Organic Compounds in Sediment from the HHA Fort George G. Meade, Maryland age 1 of 1

Site ID	HHASE-1	HHASE-2	HHASE-3	HHASE-4	94QC-402
Field Sample ID	H1D0001A	H1D0002A	H1D0003A	H1D0004A	Q1DD402A
Site Type	STRM	STRM	STRM	STRM	STRM
Start Depth (ft bgs)	0	0	0	0	0
End Depth (ft bgs)	0.5	0.5	0.5	0.5	0.5
Media	CSE	CSE	CSE	CSE	CSE
QC Type					Dup of HHASE-4
VOLATILE ORGANIC COMPOUNDS (ug/g)					
AROMATICS					
Benzene	0.1 LT	0.1 LT	0.1 LT	0.1 LT	0.1 LT
Toluene	0.1 LT	0.1 LT	0.1 LT	0.1 LT	0.1 LT
Ethylbenzene	0.19 LT	0.19 LT	0.19 LT	0.19 LT	0.19 LT
m-Xylene	0.23 LT	0.23 LT	0.23 LT	0.23 LT	0.23 LT
Xylenes	0.78 LT	0.78 LT	0.78 LT	0.78 LT	0.78 LT
Styrene	0.6 ND	0.6 ND	0.6 ND	0.6 ND	0.6 N
CHLORINATED AROMATICS					
Chlorobenzene	0.1 LT	0.1 LT	0.1 LT	0.1 LT	0.1 LT
1,3-Dichlorobenzene	0.14 LT	0.14 LT	0.14 LT	0.14 LT	0.14 LT
Dichlorobenzene, nonspecific	0.2 LT	0.2 LT	0.2 LT	0.2 LT	0.2 LT
HALOGENATED ORGANICS					
Chloromethane	0.96 LT	0.96 LT	0.96 LT	0.96 LT	0.96 LT
Bromomethane	0.26 LT	0.26 LT	0.26 LT	0.26 LT	0.26 LT
Vinyl Chloride	1.8 LT	1.8 LT	1.8 LT	1.8 LT	1.8 LT
Chloroethane	0.64 LT	0.64 LT	0.64 LT	0.64 LT	0.64 LT
Methylene Chloride	4.4 LT	4.4 LT	4.4 LT	4.4 LT	4.4 LT
1,1-Dichloroethene	0.27 LT	0.27 LT	0.27 LT	0.27 LT	0.27 LT
1,1-Dichloroethane	0.49 LT	0.49 LT	0.49 LT	0.49 LT	0.49 LT
1,2-Dichloroethylenes (cis and trans isomers)	0.32 LT	0.32 LT	0.32 LT	0.32 LT	0.32 LT
Chloroform	0.24 LT	0.24 LT	0.24 LT	0.24 LT	0.24 LT
1,2-Dichloroethane	0.32 LT	0.32 LT	0.32 LT	0.32 LT	0.32 LT
1,1,1-Trichloroethane	0.2 LT	0.2 LT	0.2 LT	0.2 LT	0.2 LT
rbon Tetrachloride	0.31 LT	0.31 LT	0.31 LT	0.31 LT	0.31 LT
modichloromethane	0.2 LT	0.2 LT	0.2 LT	0.2 LT	0.2 LT
T,2-Dichloropropane Trichloroethene	0.53 LT	0.53 LT	0.53 LT	0.53 LT	0.53 LT
	0.23 LT	0.23 LT	0.23 LT	0.23 LT	0.23 LT
1,3-Dichloropropane Dibromochloromethane	0.2 LT	0.2 LT	0.2 LT 0.25 LT	0.2 LT	0.2 LT
1,1,2-Trichloroethane	0.25 LT	0.25 LT		0.25 LT	0.25 LT
2-Chloroethylvinyl Ether	0.33 LT 0.5 LT	0.33 LT 0.5 LT	0.33 LT 0.5 LT	0.33 LT 0.5 LT	0.33 LT 0.5 LT
Bromoform	0.5 LT	0.5 LT	0.5 LT	0.5 LT	0.5 L1 0.2 LT
1,1,2,2-Tetrachloroethane	0.2 LT	0.2 LT	0.2 LT	0.2 LT	0.2 LT
Tetrachloroethene	0.16 LT	0.16 LT	0.16 LT	0.16 LT	0.16 LT
Carbon Disulfide	0.6 ND	0.6 ND	0.6 ND	0.6 ND	0.6 N
cis-1,3-Dichloropropene	0.6 ND	0.6 ND	0.6 ND	0.6 ND	0.6 N
trans-1,3-Dichloropropene	0.6 ND	0.6 ND	0.6 ND	0.6 ND	0.6 N
WATER SOLUBLES	A				
Acetone	3.3 LT	3.3 LT	3.3 LT	3.3 LT	3.3 LT
2-Butanone	4.3 LT	4.3 LT	4.3 LT	4.3 LT	4.3 LT
4-Methyl-2-Pentanone	0.63 LT	0.63 LT	0.63 LT	0.63 LT	0.63 LT
2-Hexanone	1 ND	1 ND	1 ND	1 ND	1 N
OTHER					
Acrylonitrile	2 LT				
Trichlorofluoromethane	0.23 LT	0.23 LT	0.23 LT	0.23 LT	0.23 LT
Vinyl Acetate	1 ND	1 ND	1 ND	1 ND	1 NE
TOTAL VOC	0	ō	0	0	0
TOTAL DETROI SUM HVDDOCA PROAS	40.17	10 LT	10 17	40.17	40 17
TOTAL PETROLEUM HYDROCARBONS Collection Date	10 LT 21-Jan-94	10 L1 21-Jan-94	10 LT 21-Jan-94	10 LT	10 LT
Collection Date Extraction Date	21-Jan-94 25-Jan-94	21-Jan-94 25-Jan-94	21-Jan-94 25-Jan-94	21-Jan-94 25-Jan-94	21-Jan-94 25-Jan-94
Analysis Date	29-Jan-94	29-Jan-94	29-Jan-94	29-Jan-94 29-Jan-94	29-Jan-94 29-Jan-94
Notes:	L5-0011-34	25-Jail-34	63-0d11-34	23-Jd1-34	23-Jd11-34

⁽¹⁾ LT - less than detection limit; ND - not detected (2) ft bgs - feet below ground surface

TABLE HHA-9: Semivolatile Organic Compounds in Sediment from the HHA Fort George G. Meade, Maryland Page 1 of 2

Site ID Field Sample ID Site Type	HHASE-1 H1D0001A STRM	HHASE-2 H1D0002A STRM	HHASE-3 H1D0003A STRM	HHASE-4 H1D0004A STRM	94QC-402 Q1DD402A STRM
Start Depth (ft bgs) End Depth (ft bgs) Media	0 0.5 CSE	0 0.5 CSE	0 0.5 CSE	0 0.5 CSE	0 0.5 CSE
CC Type SEMIVOLATILE ORGANIC COMPOUNDS (ug/g)					Dup of HHASE-4
CHLORINATED MONOCYCLIC AROMATICS					
1,3-Dichlorobenzene	0.042 LT				
1,4-Dichlorobenzene	0.034 LT	0.034 LT 0.042 LT	0.034 LT 0.042 LT	0.034 LT 0.042 LT	0.034 LT 0.042 LT
1,2-Dichlorobenzene	0.042 LT 0.22 LT	0.042 LT	0.22 LT	0.22 LT	0.22 LT
1,2,4-Trichlorobenzene 1,2,3-Trichlorobenzene	0.032 LT	0.032 LT	0.032 LT	0.032 LT	0.032 LT
Hexachlorobenzene	0.08 LT				
NITROSAMINES N-Nitroso dimethylamine	0.46 L1	0.46 L1	0.46 LI	0.46 LT	0.46 LT
N-Nitroso-Di-n-Propylamine	1.1 LT				
N-Nitroso diphenylamine	0.29 LT				
NITROMONOCYCLIC AROMATICS	1.8 LT	1.8 LT	1.8 LT	1.8 L1	1.8 LT
Nitrobenzene 3-Nitrotoluene	0.34 LT				
2,6-Dinitrotoluene	0.32 LT				
2,4-Dinitrotoluene	1.4 LT				
PHENOLS	0.052 LT				
Phenol 2-Chlorophenol	0.052 LT	0.055 LT	0.055 LT	0.055 LT	0.055 LT
2-Methyl Phenol	0.098 LT				
4-Methyl Phenol	0.24 LT				
2-Nitrophenol	1.1 LT 3 LT	1.1 LT 3 LT	1.1 LT 3 LT	1.1 LT 3 LT	1.1 LT 3 LT
2,4-Dimethylphenol 2,4-Dichlorophenol	3 LT 0.065 LT	0.065 LT	0.065 LT	0.065 LT	0.065 LT
p-Chloro-m-cresol (4-Chloro-3-methylphenol)	0.93 LT	0.93 LT	0.93 LT	0.93 LT	0.93 LT
2,4,6-Trichlorophenol	0.061 LT				
2,4,5-Trichlorophenol	0.49 LT	0.49 LT	0.49 LT	0.49 LT 0.62 LT	0.49 LT 0.62 LT
2,3,6-Trichlorophenol 2,4-Dinitrophenol	0.62 LT 4,7 LT	0.62 LT 4.7 LT	0.62 LT 4.7 LT	4.7 LT	4.7 LT
4-Nitrophenol	3.3 LT				
Methyl-4,6-Dinitrophenol	0.8 LT				
Dibenzofuran Pentachlorophenol	0.38 LT 0.76 LT	0.38 LT 0.76 LT	0.38 LT 0.76 LT	0.38 LT 0.76 LT	0.38 LT 0.76 LT
PHOSPHOROUS CONTAINING					
Dimethyl methylphosphonate Diisopropyl methylphosphonate	NA NA	NA NA	NA NA	NA NA	NA NA
PCB's					
PCB-1016	0.32 LT				
PCB-1221	0.32 ND				
PCB-1232	0.32 ND	0.32 ND	0.32 ND 0.32 ND	0.32 ND 0.32 ND	0.32 ND 0.32 ND
PCB-1242 PCB-1248	0.32 ND 0.32 ND	0.32 ND 0.32 ND	0.32 ND	0.32 ND	0.32 ND
PCB-1254	0.32 ND				
PCB-1260	0.79 LT				
PCB-1262	6.3 LT				
PHTHALATES Dimetryl Phthalate	0.063 LT	0.063 E1	0.063 LT	0.063 LT	0.063 L.1
Diethyl Phthalate	0.24 LT				
Di-n-butyl Phthalate	5.5	1.3 LT	1.3 LT	1.3 LT	1.3 LT
Butyl Benzyl Phthalate	1.8 LT	1.8 LT	1.8 LT	1.8 LT 0.48 LT	1.8 LT 0.48 LT
Bis (2-Ethyl hexyl) Phthalate Di-n-octyl Phthalate	0.48 LT 0.23 LT	0.48 LT 0.23 LT	0.48 LT 0.23 LT	0.46 LT 0.23 LT	0.23 LT
POLYNUCLEAR AROMATICS					
Naphthalene 2-Methylnaphthalene	0.74 LT 0.032 LT	0.74 LT 0.032 LT	0.74 LT 0.032 LT	0.74 LT 0.032 LT	0.74 LT 0.032 LT
2-Metryinaphthalene 2-Chloronaphthalene	0.032 LT	0.24 LT	0.24 LT	0.24 LT	0.24 LT
Acenaphthylene	0.033 LT				
Acenaphthene	0.041 LT	0.041 LT	0.041 LT	0.041 LT 0.065 LT	0.041 LT 0.065 LT
Fluorene	0.065 LT 0.032 LT	0.065 LT 0.032 LT	0.065 LT 0.032 LT	0.032 LT	0.032 LT
Phenanthrene Anthracene	0.032 LT	0.032 LT 0.71 LT	0.71 LT	0.032 LT	0.71 LT
Aninracene Fluoranthrene	0.09	0.032 LT	0.032 LT	0.062	0.032 LT
Pyrene	0.083 LT				

TABLE HHA-9: Semivolatile Organic Compounds in Sediment from the HHA Fort George G. Meade, Maryland
Page 2 of 2

Field Sample	Page 2 of 2					
Sim Type STRM		HHASE-1	HHASE-2	HHASE-3	HHASE-4	94QC-402
San Cheph (https)						
End Deprin (18 pg)				1		
Mode CSE						
Digit Digi						CSE
POLYNUCLEAR AROMATICS		552				Dup. of HHASE-4
Bearson Color Co						
Chypones				8844 17	8 8 A A A A A A A A A A A A A A A A A A	8844 11
Berrico (i) Fluorambnee 0.31 LT						
Barzo (s) Fluorinthene						0.31 LT
Beroz (s) Pyrene						0.13 LT
Indepted 2.2 A IT 2.4 IT 2.4 IT 2.4 IT 2.4 IT 2.4 IT 2.5 I						1.2 LT
Disenting (a)P) Arthristance 0.31 LT 1.31 LT 0.31 LT 0.32 LT 0.3						2.4 LT
Berrox (pit) Peryleme						0.31 LT
PESTICIDES				0.18 LT	0.18 LT	0.18 LT
Agrica BPRC 1.3						
Bea-BHC				177	19 11	1.3 LI
Abrazine						
Lindame (G-BHC)						
Delits BHC Company C						0.1 LT
Heptachion	Delta-BHC					
Biomacal Mailathion 0.18 LT 0.18						0.24 LT
Maistrion			NA	NA.	NA	NA
Aldrin						0.18 LT
Support Supp						
Seddin						
Hepearhor Epoxide						
Chlorders						0.48 LT
Vapora						0.68 LT
Endosulfan						0.068 LT
Dielpfin		0.4 LT	0.4 LT	0.4 LT		
Endrin Aldehyde	4,4DDE					
Finding	Dieldrin					
A-LDDC	Endrin Aldehyde					
2.4 LT 2.4 LT 2.4 LT 2.4 LT 2.4 LT 2.4 LT DOT						1.3 LT
DOT						
Endosultan Sulfate						
Methoxychlor						1.2 LT
Mires Christopen Christop						
Endire Ketone 12 kT 13 kT 13 k						0.14 LT
SULFUR CONTAINING				0.28 ND	0.28 ND	0.28 ND
D-Chiorophenylmethyl Sulfide	Toxaphene	12 LT	12 LT	12 LT	12 LT	12 LT
D-Chiorophenylmethyl Sulfide	CITI ELID CONTA INIDIC					
PChlorophenylmethyl Sulfide 4-Chlorophenylmethyl Sulfide 4-Chlorophenylmethyl Sulfide 5-Chlorophenylmethyl Sulfide 6-Chlorophenylmethyl Sulfide 6-Chlorophenylmethyl Sulfide 7-Chlorophenylmethyl Sulfide 7-Chlorophenylmethyl Sulfide 8-Chlorophenylmethyl ethyl Sulfide 8-Chlorophenylmethylmethyl Sulfide 8-Chlorophenylmethylmethyl Sulfide 8-Chlorophenylmethylmethyl Sulfide 8-Chlorophenylmethylmethyl Sulfide 8-Chlorophenylmethylmethyl Sulfide 8-Chlorophenylmethylmethyl Sulfide 8-Chlorophenylmethylmethyl Sulfide 8-Chlorophenylmethylmethylmethyl Sulfide 8-Chlorophenylmethylme		032 11	032 11	0.32 1.1	0.32 LI	0.32 LT
## AChloropherylmetryl Sulfone 0.066 LT 0.066 LT 0.066 LT 0.066 LT 0.066 LT 0.066 LT 0.066 LT 0.066 LT 0.066 LT 0.066 LT 0.066 LT 0.066 LT 0.066 LT 0.066 LT 0.066 LT 0.066 LT 0.075 LT 0.075 LT 0.075 LT 0.075 LT 0.075 LT 0.075 LT 0.086 LT 0.086 LT 0.086 LT 0.086 LT 0.086 LT 0.086 LT 0.086 LT 0.082 LT 0.082 LT 0.082 LT 0.082 LT 0.082 LT 0.082 LT 0.082 LT 0.082 LT 0.082 LT 0.082 LT 0.082 LT 0.082 LT 0.082 LT 0.082 LT 0.082 LT 0.082 LT 0.082 LT 0.085 LT						0.097 LT
OTHER						0.066 LT
1,4-Cyathane (Thioxane)						
Bis (2-Chloroethyl) Ether						X 8 9 F 1 T
Dicyclopentadiene						
Benzyl Alcohol 0.032 LT 0.032 LT 0.032 LT 0.032 LT 0.032 LT 0.032 LT 0.032 LT 0.032 LT 0.044 LT 0.46 LT 0.065 LT 0						0.36 LT 0.57 LT
Bis (2-Chloroisopropyl) Ether 0.44 LT 0.44 LT 0.44 LT 0.44 LT 0.44 LT 0.44 LT 0.44 LT 0.44 LT 0.44 LT 0.45 LT 0.65 LT 0.671 LT 0.071 LT 0.071 LT 0.071 LT 0.071 LT 0.071 LT 0.071 LT 0.071 LT 0.071 LT 0.072 LT 0.099 LT 0.099 LT 0.19 LT						0.032 LT
Dithiane	Bis (2-Chloroisopropyl) Ether			0.44 LT	0.44 LT	0.032 LT
Hexachloroethane					0.065 LT	0.065 LT
Sophorone	Hexachloroethane	1.8 LT	1.8 LT			1.8 LT
Sophorone 0.39 LT 0.31 ND 3.1 ND 3.1 ND 0.63 ND 0.	Dibromochloropropane					0.071 LT
Bertzoic Acid 3.1 ND 3.1	Isophorone					0.39 LT
4-Chloroaniline						0.19 LT
Hexachlorobutadiene						3.1 ND
2-Nitroniline 3.1 ND 3.1						0.63 ND
3 LT 3 LT 3 LT 3 LT 3 LT 3 LT 3 LT 3 LT						0.97 LT
4-Nitroaniline 3.1 ND 3						3.1 ND 3 LT
4-Chlorophenyl Phenyl Ether 0.17 LT 0.17 LT 0.17 LT 0.17 LT 0.17 LT 0.17 LT 0.17 LT 0.17 LT 0.17 LT 0.19 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.57 LT 0.57 LT 0.57 LT 0.57 LT 0.57 LT 0.57 LT 0.57 LT 0.57 LT 0.57 LT 0.59 LT 0.59 LT 0.59 LT 0.59 LT 0.59 LT 0.59 LT 0.59 LT 0.59 LT 0.59 LT 0.59 LT 0.59 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.55 LT 0.						3.1 ND
1,2-Diphenyl Hydrazine 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.57 LT 0						0.17 LT
2.6-Dinitroaniline						0.52 LT
4-Bromophertyl Phenyl Ether 0.041 LT 0.						0.57 LT
3.5-Dinitroaniline 1.6 LT 1.6 LT 1.6 LT 1.6 LT 1.6 LT 1.6 LT 1.6 LT 1.6 LT 1.6 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 0.52 LT 1.6 LT						0.041 LT
Hexachlorocyclopentadiene 0.52 LT 0.52						1.6 LT
TOTAL SVOC 5.6 0 0 0.062 0 Collection Date 21-Jan-94 21-Jan-94 21-Jan-94 21-Jan-94 21-Jan-94 21-Jan-94	Hexachlorocyclopentadiene	0.52 LT	0.52 LT	0.52 LT		0.52 LT
Collection Date 21-Jan-94 21-Jan-94 21-Jan-94 21-Jan-94 21-Jan-94		1.6 LT	1.6 LT	1.6 LT	1.6 LT	1.6 LT
Collection Date 21-Jan-94 21-Jan-94 21-Jan-94 21-Jan-94 21-Jan-94	TOTAL OUGO		_	_	0.000	•
■MORTING I ZN-MAT-MA I ZN-MAT-MA I ZN-MAT-MA ZN-MAT-MA ZN-MAT-MA	Extraction Date	26-Jan-94	26-Jan-94	26-Jan-94	26-Jan-94	26-Jan-94
vsis Date 03-Feb-94 03-Feb-94 03-Feb-94 03-Feb-94						

ss:
(1) LT - less than detection limit; ND - not detected
(2) ft bgs - feet below ground surface

	STRM	STBM	H1D0003A	H1D0004A	O1DD402A
Start Depth (ft bots)		N C	N C	NE C	N C
End Depth (it bgs)	0.0 0.5 0.5	0.5	0.5	0.0 20.5	0.0
Total/Dissolved QC Type	Total	Total	Total	Total	Total
METALS (ug/g)					
Aliminim	15700	4030	7,00	9	
Antimony					
Arsenic	25 LT	2.5 LT	2.5 LT	2.5 LT	2.5 LT
Bervlium	110				
Boron		6.64 LT	664 LT	17 7350	664 IT
Cadmium	1.2 LT	1.2 LT	1.2 LT	1.2 LT	1.2 LT
Cardell	25.5	313	92	335	382
Cobait	14.2	3.07		6.52 3.91	8.32 9.85
Copper	12.4	2.84 LT	2.84	2.84 LT	2.84 LT
lou.	20600	4050	1870		
Lead	10.6	87.7	9.5	3.88	4.46
Manganese	327	888	228 523	828 90.5	88.5
Mercury					
Molybdenum	14.3 LT	14.3 LT	14.3 LT	14.3	14.3 LT
Nickel		_			
Potassium	1830				
Seenium	0.449 L1		0.449 L1		
Society					
Tellurium		14.9 LT	14.9 LT	14.9 LT	14.9 LT
Thallium	34.3 LT	34.3 LT	34.3 LT		
Tin Vanadim	7.43 LT	_			
Variación	32.0	0.4. 0.0	7- 1	[c./	9.23
2 2	6.20	5.21	c/.c	19.5	22.3
Heavy Metals Grand Total Metals	52	2820	3776	14 10805	17
Collection Date	21-Jan-94	21-Jan-94	21-Jan-94	21-Jan-94	21-Jan-94
Extraction Date	03-Feb-94	03-Feb-94	03-Feb-94	03-Feb-94	03-Feb-94

TABLE HHA-10: Metals in Sediment from the HHA Fort George G. Meade, Maryland Page 1 of 1

Notes:
(1) LT - less than detection limit; ND - not detected
(2) ft bgs - feet below ground surface
(3) Heavy metals include Sb,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag

Appendix K: Inactive Landfill #2 Analytical Results

Note: The term "LT" indicates that a certified analyte is not detected. The term "ND" is used for analytes that are added to certified methods but have not gone through the certification process. The term "LT" is followed by the certified reporting limit, it does not signify that a compound was actually detected but not included because results were below the Contract Required Detection Limit.

Appendix K: Inactive Landfill #2 Analytical Results

Table IL2-1: Field Screening and Metals Data for Ground Water from the IL2

TABLE IL2-1: Field Screening and Metals Data for Ground Water from the IL2 Forge George G. Meade, Maryland

Page 1 of 2

1 1	
	2.35 2.35 2.35 2.35 2.36 2.38 2.38 2.38 2.13 2.13 2.13 2.13 2.13 2.13 2.13 2.13
	55 55 55 555 55
5.89 0.107 13.3 799	2790 6.05 1.055 1.055 1.057 33.100 38.8 38.8 38.7 38.7 35.1 52.0 2.53 2.53 2.53 3.2.1 5.2.1 5.2.1 3.2.1 5.2.1 3.2.1 3.2.1 5.2.3 3.2.1 5.2.3 3.2.1 5.2.3 3.2.1 5.2.3 3.3.1 5.3.
	55 5 5 5 5 5 55 55 55555
	112 999 999 11.12 27.4 2880 168 2880 1880 1880 1890 1890 1890 1890 1890 1
6.41 0.827 8.1 >999	19900 125 125 102000 102000 132000 132000 132000 132000 1320
	555 555 555 5 555 55 55555
	25.56 6.78 6.78 6.78 6.78 6.78 6.78 6.78 6.7
5.43 0.144 10.4 >999	3490 60 60 84.8 84.8 13500 13500 13500 11.1 11.1 12.5 13.1 14.0 14.0 15.2 17.0 18.0 19.0 19.0 19.0 19.0 19.0 19.0 19.0 19
	555 555 555 5 555 55 55555
	2.250 2.276
5.64 0.161 12.4 10	609 609 609 603 67.8 16.8 15.4 15.4 17.2 682 682 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5
FIELD PARAMETERS pH Conductivity (umhos/cm2) Temperature (C) Turbidity (NTU) METALS (und)	Aluminum Antimory Arsenic Barium Beryllium Boron Cadmium Copper Iron Cobalt Copper Iron Magnesium Magnesium Magnesium Magnesium Nickel Potas sium Selenium Silver Tellurium Tin Vanadum Vanadum
	5.64 5.43 6.41 0.161 0.144 0.827 12.4 10.4 8.1 10 >999

Heavy Metals include Sb,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag; LT= Less than detection limits; ND= Not detected
 Depth based on total depth measurement assuming a 10-ft screen and a 2.5-ft stock-up (no well log available)

55

51 112861

10 178083

180 297802

57296 Feb-93

10992

21 51727 Feb-93

TOTAL HEAVY METALS(1) TOTAL METALS

TABLE IL2-1: Field Screening and Metais Data for Ground Water from the IL2 Forge George G. Meade, Maryland Page 2 of 2

raye z oi z	777 7000	111 0000	000 1111	000 1181		70 118	910 9000	0000000
Sample Locatori logritarcatori Field Sample ID	Q1MD451Y	01MD451Z	IIM030SY	11M030SZ	MW-31	11M0031Z	Q1XF150Y	Q1XR250Y
Site Type Screen Start Depth (ft bgs)	WEL	WE	WELL 15	WELL 15	WELL 12.5	WELL 12.5	HECK.	HNSW
Screen End Depth (it bgs)	081	0 0 0 0 0 0 0 0 0	8	8	27.5	27.5	COM	, WES
Total Dissolved OCT Vine	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total Rack	Total Rinse Water
FIELD PARAMETERS								
pH Conductivity (umhos/cm2) Temperature (C)			6.2 0.233 11.8		6.62 0.099 11.2		\$ \$\$	\$ \$\$:
Unbidity (NTU) METALS (ug/L)			666<		666<		¥	V.
Aluminum						112 LT	112	112
Antimony		11 136 11	1 60 LT		86 L	_	8 %	8 %
Barium		- ၂ ၁၉ ၂၉		65.6	582	•	2.82	2.82
Beryllium Boron	_	. 12			3.7	1.12 LT 466	1.12	1.12
Cadmium			6.78	LT 6.78 LT	6.78	6.78	6.78	6.78
Caldium	148000	157000	36805	_	147000	_	5 5	105
Cobalt	25 -	T 25 L	83.2	25 [1	52.6		88	25.
Copper	18.8	.T 18.8 L	198 T	18.8 LT 5440	76.3	18.8 LT	18.8 LT 77.5 LT	18.8 LT
Lead	5.43	4.47 L	173	4.47 LT	47.6	_	26.1	4.47
Magnesium	162	135 L	7830		26800 26800		135	135
Mercury	90	T 9:0/ L	0.47		0.106	_		0.0
Molybdenum	52.7	_T 52.7 L	_	LT 52.7 LT	52.7 LT		52.7	52.7
Noxel Potassiim	105001	113000 1	0509 0509	_	32.1 L1	_	32.1 1240	32.1 1240
Selenium	2.53	_T 2.53 L						2.53
Vilver See 1	13000	·		2008	10201	_	2 g	2 g
Tellurium	118	118 L		118 -	118 1	_	118	118
Thallium	125	T 125 L					525	525
Vapadium	30.6	276 1			- 55.5 - 53.6 - 53.6			59.9 27.6
Zinc	18	LT 47.7	282	_		_	8	8
TOTAL HEAVY METALS(1)	45	27	451	0 61546	189	18	5,26	00
Collection Date:	17-Feb-93	17-Feb-93	17-Feb-93	17-Feb-93	17-Feb-93	17-Feb-93	17-Feb-93	17-Feb-93
NOTES:								

NOTES: (1) = Heavy Metals include Sb,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag; LT= Less than detection limits; ND= Not detected (2) Depth based on total depth measurement assuming a 10-ft screen and a 2.5-ft stick-up (no well log available)

Appendix L: Ordnance Demolition Area Analytical Results

Table ODA-1: Explosives Data for Soil from the ODA
Table ODA-2: Metals Data for Soil from the ODA
Table ODA-3: Field Screening and Metals Data for Ground Water from the ODA
Table ODA-4: Explosives Data for Ground Water from the ODA
Table ODA-5: Volatile Organic Compounds in Ground Water from the ODA

Semivolatile Organic Compounds in Ground Water from the ODA

Note: The term "LT" indicates that a certified analyte is not detected. The term "ND" is used for analytes that are added to certified methods but have not

certified reporting limit, it does not signify that a compound was actually detected but not included because results were below the Contract Required

gone through the certification process. The term "LT" is followed by the

Detection Limit.

Table ODA-6:

TABLE ODA-1: Explosives Data for Soil from the ODA Fort George G. Meade, Maryland Page 1 of 2

Field Campb ID	O CAMAN-	CUAMW-1	CCAMW-1	CDAMW-2	ODAMW-2	ODAMW-2	ODAMW-3	ODAMW-3	ODAMW-3
Site Type	BORE	BORE	908 908 908	BORE	O BOOZE BORE	O1B002C BORE	O1B003A BORE	O1B0003B BORF	01B0003C
Start Depth (ft bgs)	0	ß	9	0	S	9	0	S	5
End Depth (it bgs)	2000	7	12	8	7	12	2	7	12
Wedla Total Discolor	3	3,	8	တွင် တ	တွ တ	တ္တ	<u>ග</u>	တ္တ	SS
OC Type	<u> </u>	lotal	l otal	Total	Total	Total	Total	Total	Total
EXPLOSIVES (ug/g)									
HMX	2 17	2 LT	2 17	11 6	71.6	11 6	11 6	11 6	
RDX	1.28 LT	1.28		187	128 -	1 %	2 2 2	1 20 1	7 2 2
1,3,5-Trinitrobenzene	0.922 LT	0.922 LT	-	0 922 IT	TI 2260	TI 2250	TI 000	T 1 0000	1 0000
1,3-Dinitrobenzene	0.504 LT	0.504 LT	0.504 LT		0.504	0.504	0.504 IT	0.504	
Nitrobenzene	1.14 LT	1.14 LT			114 17	1 14 IT	1 14 IT	1 14 1	_
2,4,6-Trinitrotoluene	2 LT	2 LT	2 [1	2 17	2 1	1 0		10	1 h
Tetryl	2.11 LT	2.11 LT			21 IT	_	2 11 IT	2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	_
2,4-Dinitrotoluene	2.5 LT	25 LT	25 IT	25 IT	25.17	, c		25.17	-
2,6-Dinitrotoluene	2 LT	2 17	_		2 2		1 0	30	
Collection Date:	22-Jan-93	22-Jan-93	22-Jan-93	25-Jan-93	25-Jan-93	25-Jan-93	26-Jan-93	26-Jan-93	26. Jan. 03
Extraction Date:	23-Feb-93	23-Feb-93	23-Feb-93	23-Feb-93	23-Feb-93	23-Feb-93	23-Feb-93	23-Feb-93	23-Feb-93
Analysis Date:	25-Feb-93	25-Feb-93	25-Feb-93	25-Feb-93	25-Feb-93	25-Feb-93	25. Foh 03	23 Feb. 03	22 Fob 03

NOTES: (1) LT= Less than detection limits

TABLE ODA-1: Explosives Data for Soil from the ODA Fort George G. Meade, Maryland

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or dealer a means, mary an	Page 2 of 2	

Field Sample ID Site Type Start Deoth (ft bas)	O1B0004A BORE	0180004B BORE	Q1XF100Y FBLK	QIXF101Y FBLK	O1XF102Y FBLK	Q1XR200Y RNSW	Q1XR201Y RNSW	Q1XR202Y RNSW
End Depth (ft bgs) Media Total/Dissolved QC Type	CSO Total	7 CSO Total	CSW Total Field Blank	CSW Total Field Blank	CSW Total Field Blank	cSW Total Rinse Water	CSW CSW Total Rinse Water	CSW Total Rinse Water
EXPLOSIVES (ug/g)								
HWX	2 17	2 LT	0.53 LT	0.53 LT		0.53 LT	0.53 LT	0.53 LT
RDX	1.28 LT	1.28 LT		0.42 LT	0.42 LT	0.42 LT	0.42 LT	
1,3,5-1 (illitropenzene 1,3-Dinitrobenzene	0.922 L1	0.504	0.21 LI	0.88 0.46 LT	0.7 0.46 LT	0.96 0.46	0.21	
Nitrobenzene	1.14 LT	1.14 LT		0.68 LT			0.68	
2,4,6-Trinitrotoluene	2 11	_		_			0.43 LT	
Tetryl	2.11	_		_			0.63 LT	
2,4-Dinitrotoluene	25 17	2.5 LT 2 LT	0.4 LT 0.6 LT	9.00 1.1	0.4 0.6 LT	0.4 LT 0.6 LT	0.4 LT	0.4 LT 0.6 LT
Collection Date:	26-Jan-93	26-Jan-93	22-Jan-93	25-Jan-93	26-Jan-93	22-Jan-93	25-Jan-93	26-Jan-93
Extraction Date:	23-Feb-93	23-Feb-93	26-Jan-93	26-Jan-93	01-Feb-93	26-Jan-93	26-Jan-93	01-Feb-93
Analysis Date;	25-Feb-93	25-Feb-93	13-Feb-93	13-Feb-93	13-Feb-93	13-Feb-93	13-Feb-93	13-Feb-93

TABLE ODA-2: Metals Data for Soll from the ODA Fort George G. Meade, Maryland Page 1 of 2

0.55 LT 4.35 L	ODAMW22 O1B0002C DORE BORE LT 12 CSO Total LT 2,24 LT 2,34 LT 2,34 LT 2,34 LT 2,34 LT 3,37 LT 2,34 LT 3,43 LT 1,43 LT
	ODAMW3 ODDAMW3 O180003A BORE BORE CSO CSO 1 19.6 17.2 17.2 18.110 22.1 17.2 24.3 17.2 27.4 17.3 34.3 17.3 34.3 17.3 34.3 17.3 34.3 17.3 34.3 17.3 34.3 17.3 34.3 17.3 34.3 17.3 34.3 17.3 34.3 17.3 34.3 17.3 34.3 17.3 34.3
מבלבלבל בלב ב ב ב ב ב	

(1) LT = Less than detection limits (2) Heavy metals include SB,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag

Field Sample ID Site Type Start Court (# bos)	O1B0004A BORE	00ASB4 01B0004B BORE	COLXF100Y FBLK	O1XF101Y FBLK	O1XF102Y FBLK	G1XR200Y RNSW	G1XR201Y RNSW	Q1XR202Y RNSW
End Depth (ft bgs) Media	~ %	, ~ S	CSW	CSW	SSW	i 'wso	CSW	' 'SW
Total/Dissolved QC Type	Total	Total	Total Field Blank	Total Field Blank	Total Field Blank	Total Rinse Water	Total Rinse Water	Total Rinse Water
METALS (ug/g)								
Afuminum	6820	2750	_	112	_	762		_
Antimony		LT 19.6 LT	8		_	9 F	8	
Barium	 8.04	8.93 6.93		8 E		_	_	
Beryllium	Ξ.	T 0.427 LT	1.12 LT		1.12 LT	1.12 LT	1.12 LT	1.12 230
Cadmium		12 IT	82.9	82.49				
Calcium	25900	<u>8</u>	55	\$5		•		
Cohat	4 38	12.1 25.1T	16.8	16.8		_		5. K
Copper	47.1	-	18.8	18.8		18.8 LT	18.8 LT	18.8
Iron	12700	8820 3		77.5		7780		_
Magnesium	2830		135	135		135 LT	135 LT	
Manganese	155		9.67	9.67		_	_	
Molybdenum		US L1 LT 14.3 LT	52.7	52.7				
Nickel	11.1	2.74 [1	32.1	32.1		32.1 LT	32.1 LT	32.1 LT
Selenium	_	0.449	4.3	2.53			_	
Silver		0.803	5 k			_	_	_
Tellurium		LT 14.9 LT	118	118		118	118 118 117	148
Tin	~ ~	7.43	0 00					
Vanadium	22.2		27.6		27.6 LT	27.6 LT	27.6 LT	27.6 LT
7IUC	6.2/		_	_		_		
HEAVY METALS (2) TOTAL METALS	295 52990	24 12085	44	oω	359	44 9516	2974	537
Collection Date:	26-Jan-93 23-Feb-93	26-Jan-93 23-Feb-93	22-Jan-93 18-Feh-93	25-Jan-93 18-Feb-93	26-Jan-93 18-Feb-93	22-Jan-93 18-Feh-93	25-Jan-93 18-Feh-93	26-Jan-93 18-Feb-93
Analysis Date:	24-Feb-93	24-Feb-93	25-Feb-93	25-Feb-93	25-Feb-93	25-Feb-93	25-Feb-93	25-Feb-93

TABLE ODA-2: Metals Data for Soll from the ODA Fort George G. Meade, Maryland Page 2 of 2

(1) LT = Less than detection limits

TABLE ODA-4: Explosives Data for Ground Water from the ODA Fort George G. Meade, Maryland Page 1 of 1

Sample Location ID Field Sample ID	ODAMW-1 O1M0001	ODAMW-2 O1M0002	ODAMW3 O1M0003	930C-154 01XF154Y	93QC-254 Q1XB254V	
Site Type	WELL	WELL	WELL	FBLK	RNSW	
Screen Start Deptin (it bgs) Screen End Deptin (it bgs)	2. 5. 7. 5.	4 4	က က်	, ,		
Media Total/Dissolved	CGW	CGW	CGW	CGW	CGW	
QC Type				Field Blank	Rinse Water	
EXPLOSIVES (ug/L)						
НМХ	3.57	9.13	0.533 LT	0.53 LT	0.53 LT	
RDX	33.5	28	0.416 LT	0.42 LT		
1,3,5-Trinitrobenzene	0.21 LT	0.21 LT(K)	0.21 LT(K)	4.0		
1,3-Dinitrobenzene	0.458 LT			0.46 LT	0.46 LT	
Nitrobenzene	0.682 LT	0.682 LT	0.682 LT	0.68 LT		
2,4,6-Trinitrotoluene	0.426 LT	0.426 LT	0.426 LT	0.43 LT	0.43 LT	
Tetryl	0.631 LT	0.631 LT	0.631 LT	0.63 LT	0.63 LT	
2,4-Dinitrotoluene	0.599	0.615	0.397 LT	0.4 LT	0.4 LT	
2,6-Dinitrotoluene	0.6 LT(K)	0.6 LT(K)	0.6 LT	0.6 LT		
Collection Date:	26-Feb-93	24-Feb-93	26-Feb-93	26-Feb-93	26-Feb-93	
Extraction Date: Analysis Date:	01-Mar-93	01-Mar-93	01-Mar-93	01-Mar-93	01-Mar-93	
MOTEO.	Lo trica -oo	- CO-10141-C2	בטיויום	C2-IVIdI -53	CO-IBINI-CZ	

NOTES: (1) LT= Less than detection limits; (K) = Missed Holding Time for Extraction and Preparation

TABLE ODA-5: Volatile Organic Compounds in Ground Water form the ODA Fort George G. Meade, Maryland Page 1 of 1

Sample Location Identification Field Sample ID	ODAMW-1 O1M0001		ODAMW-2 O1M0002		ODAMW-3 O1M0003		93QC-154 Q1XF154Y		93QC-254 Q1XR254Y	
Site Type	WELL		WELL		WELL		FBLK		RNSW	
Screen Start Depth (ft bgs)	3.5		4		5		-		-	
Screen End Depth (ft bgs)	13.5		14		15		-		-	-
Media	CGW		CGW		CGW		CGW		CGW	1
Total/Dissolved	Total		Total		Total		Total		Total	1
QC Type							Field Blank		Rinse Water	er
VOLATILE ORGANIC COMPOUNDS (ug/L)										
AROMATICS										
Benzene	1	LT	1	LT	1	LT	1	LT	1	L.
Toluene	i	ĹŤ	l i	ĽΤ	l i	ĹΤ	l i	ĹŤ	l i	
Chlorobenzene	1	LT	1	LT	l i	LT	l i	LT	1 1	Ē.
Ethylbenzene	i	ĹŤ	l i	ĹΤ	l i	ĹΤ̈́	l i	ĽΤ	l i	
1,3-Dimethylbenzene	i	ĽΤ	l i	ĽΤ	l i	ĹΤ̈́	l i	ĽΤ	l i	Ľ.
Xylenes	2	LT	2	LT	2	ĹŤ	2	ĹŤ	ĺż	_
Dichlorobenzene, Nonspecific		ĹΤ	2	ĽŤ	2	ĽŤ	2	ĽΤ	2	
Styrene	2 5	ND	5	ND	5	ND	5	ND	5	
HALOGENATED ORGANICS										
Chloromethane	1.2	LT	1.2	LT	1.2	LT	1	LT	1	L
Bromomethane	14	LT	14	ĹŤ	14	ĽŤ	14	ĹŤ	14	
Vinyl Chloride	12	ĽŤ	12	ĽŤ	12	ĽΤ	12	ĽΤ	12	
Chloroethane	8	LT	8	ĽΤ	8	LT	'8	LT	8	
Methylene Chloride	1	ĽŤ	ĩ	ĽŤ	l i	ĽŤ	ì	ĽŤ	1 1	
1.1-Dichloroethene	1	ĹŤ	i	ĹŤ	l i	ĹŤ	l i	ĽΤ		Ĺ
1,1-Dichloroethane	1	ĽŤ.	i	ĽŤ	1 1	ĽŤ	l i	LŤ		
1,2-Dichloroethylenes	5	LT	5	ĹŤ	5	낦				Ľ
Chloroform	-		_				5	LT	5	
1.2-Dichloroethane	1	ĻŢ	1	LŢ	1	LŢ	1	LŢ	1	L
.,	1	LT	1	LŢ	1	LT	1 1	LT	1	L
1,1,1-Trichloroethane	1	LT	1	LT	1	LT	1	LT	1	LI
Carbon Tetrachloride	1	LT	1	LT	1	LT	1	LT	1	LI
Bromodichloromethane	1	LT	1	LT	1	LT	1	LT	1	LT
1,2-Dichloropropane	1	LT	1	LT	1	LT	8		7	
Trichloroethene	. 1	LT	1	LT	2.6		1	LT	1	LT
1,3-Dichloropropane	4.8	LT	4.8	LT	4.8	LT	5	LT	5	LT
Dibromochloromethane	1	LT	1	LT	1	LT	1	LT	1	LT
1,1,2-Trichloroethane	1	LT	1	LT	1	LT	1	LT	1	LT
2-Chloroethylvinyl Ether	3.5	LT	3.5	LT	3.5	LT	4	LT	4	LT
Bromoform	11	LT	11	LT	11	LT	11	LT	11	LT
1,1,2,2-Tetrachloroethane	1.5	LT	1.5	LT	1.5	LT	2	LT	2	LT
Tetrachloroethene	5.6		4.5		10		1	LT	1	LT
1,3-Dichlorobenzene	1	LT	1	LT	1	LT	1	LT	1	LT
Carbon Disulfide	5	ND	5	ND	5	ND	5	ND	5	N
Cis-1,3-Dichloropropene	5	ND	5	ND	5	ND	5	ND	5	N
Trans-1,3-Dichloropropene	5	ND	5	ND	5	ND	5	ND	5	NI
WATER SOLUBLE										
Acetone	8	LT	8	LT	8	LT	8	LT	8	LT
2-Butanone		LT		ĽΤ	10	ĹΤ	10	ĽΤ	10	ĽΪ
-Methyl-2-Pentanone		LT		ĽΤ	1.4	īΤ	ĭ	ĹŤ	1	ĹŤ
2-Hexanone		ND		ND		ND	_	ND		NI
OTHER										
Acrylonitrile	8.4	┎┯╽	8.4	TT	8.4	LT	8	LT	Ω	LT
richlorofluoromethane	1	ĽŤΙ	1	ĽŤ			î	LT	ì	Ľi
/inyl Acetate		ND		ND	i	ND	i	ND	i	N
OTAL VOC	6		5		13		8		7	
Collection Date:	26-Feb-93		24-Feb-93	-	26-Feb-93	-	26-Feb-93		26-Feb-93	
extraction Date:	07-Mar-93		07-Mar-93		26-reb-93 07-Mar-93		26-Feb-93 15-Mar-93		26-Feb-93 15-Mar-93	
nalysis Date:	OC-10141	- 1	OC. IAIOI .20		OL-IAIGI-20	- 1	i J-ividi -53		10-10HH-93	

NOTES: (1) LT= Less than detection limits; ND= Not detected

TABLE ODA-6: Semivolatile Organic Compounds in Ground Water from the ODA Fort George G. Meade, Maryland

Pore 4 of 0				
Page 1 of 2	I ODAMW-1	ODAMW-2	ODAMW-3	93QC-154
Sample Location ID Field Sample ID	O1M0001	O1M0002	O1M0003	Q1XF154Y
Site Type	WELL	WELL	WELL	FBLK
Screen Start Depth (ft bgs)	3.5	4	5	-
Screen End Depth (ft bgs)	13.5	14	15	
Media	CGW	CGW	CGW	CGW
Total/Dissolved				Total
QC Type				Field Blank
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)				
CHLORONATED MONOCYCLIC AROMATICS				7 11
1,3-Dichlorobenzene	3.4 LT	3.4 LI	3.4 LI	3 LT
1,4-Dichlorobenzene	1.5 LT	1.5 LT	1.5 LT	2 LT 1 LT
1,2-Dichlorobenzene	1.2 LT	12 [[1.2 LT 2.4 LT	1 LT 2 LT
1,2,4-Trichlorobenzene	2.4 LT	2.4 LT		6 LT
1,2,3-Trichlorobenzene	5.8 LT	5.8 LT 12 LT	5.8 LT 12 LT	12 LT
Hexachlorobenzene	12 LT	12 61	12 L1	
LUTTO CO A LULICO				
NITROSAMINES	9,7 LT	9.7 LT	9.7 LT	10 LT
N-Nitroso Dimethylamine	6.8 LT	6.8 LT	6.8 LT	7 LT
N-Nitroso Di-N-Propylamine N-Nitroso Diphenylamine	3.7 LT	3.7 LT	3.7 LT	4 LT
14-1418 OSO Expriently latting	0	J		
NITROMONOCYCLIC AROMATICS				
Nitrobenzene	3.7 LT	3.7 LI	3.7 LI	4 LI
3-Nitrotoluene	2.9 LT	2.9 LT	2.9 LT	3 LT
2.6-Dinitrotoluene	6.7 LT	6.7 LT	6.7 LT	7 LT
2.4-Dinitrotoluene	5.8 LT	5.8 LT	5.8 LT	6 LT
PHENOLS	L			
Phenol	2.2 LT	2.2 LT	2.2 LT	2 LT
2-Chlorophenol	2.8 LT	2.8 LT	2.8 LT	3 LT
2-Methylphenol	3.6 LT	3.6 LT	3.6 LT	4 LT
4-Methylphenol	2.8 LT	2.8 LT	2.8 LT	3 LT 8 LT
2-Nitrophenol	82 LT	8.2 LT	8.2 LT	
2,4-Dimethylphenol	4.4 LT	4.4 LT	4.4 LT	4 LT 8 LT
2,4-Dichlorophenol	8.4 LT	8.4 LT	8.4 LT 8.5 LT	9 LT
4-Chloro-3-Cresol	8.5 LT	8.5 LT		4 LT
2,4,6-Trichlorophenol	3.6 LT 2.8 LT	3.6 LT 2.8 LT	3.6 LT 2.8 LT	3 LT
2,4,5-Trichlorophenol		1.7 LT	1.7 LT	1.7 LT
2,3,6-Trichlorophenol	1.7 LT 180 LT	180 LT	180 LT	180 LT
2,4-Dinitrophenol 4-Nitrophenol	96 LT	96 LT	96 LT	96 LT
Dibenzofuran	5.1 LT	5.1 LT	5.1 LT	5 LT
4,6-Dinitro-2-Cresol	50 ND	50 ND	50 ND	50 ND
Pentachlorophenol	9.1 LT	9.1 LT	9.1 LT	9 LT
renizationopriend	3 2.	" - "		
PCBs				
PCB 1016	9.1 ND	9.1 ND	9.1 ND	9 ND
PCB 1221	7.2 ND	7.2 ND	7.2 ND	7 ND
PCB 1232	9.9 ND	9.9 ND	9.9 ND	10 ND
PCB 1242	5.2 ND	5.2 ND	5.2 ND	5 ND
PCB 1248	38 ND	38 ND	38 ND	38 ND
PCB 1254	33 ND	33 ND	33 ND	33 ND
PCB 1260	13 ND	13 ND	13 ND	13 ND
PESTICIDES	5.3 LT	5.3 L1	5.3 LT	5 LT
Alpha-Benzenehexachloride	17 LT	17 LT	17 LT	17 LT
Beta-Benzenehexachloride	5.9 LT	5.9 LT	5.9 LT	6 LT
Atrazine Lindane	7.2 LT	7.2 LT	7.2 LT	7 LT
Delta-Benzenehexachloride	3 ND	3 ND	3 ND	3 ND
Heptachlor	38 LT	38 LT	38 LT	38 LT
Bromacil	2.9 LT	2.9 LT	2.9 LT	3 LT
Malathion	21 LT	21 LT	21 LT	21 LT
Parathion	37 LT	37 LT	37 LT	37 LT
Aldrin	13 LT	13 LT	13 LT	13 LT
Supona	19 LT	19 LT	19 LT	19 LT
Isodrin	7.8 LT	7.8 LT	7.8 LT	8 LT
Heptachlor Epoxide	28 LT	28 LT	28 LT	28 LT
Chlordane	37 ND	37 ND	37 ND	37 ND
Vapona	8.5 LT	8.5 LT	8.5 LT	9 LT
Endosulfan I	23 17	23 LT	23 LT 14 LT	23 LT 14 LT
2,2-Bis (Para-Chlorophenyl)-1,1-Dichloroethene	14 LT	14 LT		
Dieldrin	26 LT	26 LT 5 LT	26 LT 5 LT	26 LT 5 LT
Endrin Aldehyde	5 LT			18 LT
Endrin	18 LT	18 LT	18 LT 18 LT	18 LT
2,2-Bis (Para-Chlorophenyl)-1,1-Dichloroethane	18 LT 42 LT	18 LT 42 LT	42 LT	42 LT
Endosulfan II		18 LT	18 LT	18 LT
2,2-Bis (Para-Chlorophenyl)-1,1,1-Trichloroethane	18 LT 50 LT	18 L1 50 LT	50 LT	50 LT
Endosulfan Sulfate	11 LT	11 LT	11 LT	11 LT
Methoxychior	24 LT	24 LT	24 LT	24 LT
Mrex Endrin Ketone	6 ND	6 ND	6 ND	6 ND
Endrin Ketone	17 ND	17 ND	17 ND	17 ND
Toxaphene	17 NO	17 190	., 140	., .,

TABLE ODA-6: Semivolatile Organic Compounds in Ground Water from the ODA Fort George G. Meade, Maryland Page 2 of 2

Page 2 of 2				
Sample Location ID	ODAMW-1- O1M0001	ODAMW-2 O1M0002	ODAMW-3 O1M0003	93QC-154 Q1XF154Y
Field Sample ID Site Type	WELL	WELL	WELL	FBLK
Screen Start Depth (ft bgs)	3.5	4	5	1 001
Screen End Depth (ft bgs)	13.5	14	15	-
Media	CGW	CGW	CGW	CGW
Total/Dissolved	i			' Total
QC Type				Field Blank
PHOSPHOROUS CONTAINING				
Dimethylmethyl Phosphate	130 LT	130 LT	130 LT	130 LT
Diisopropylmethyl Phosphonate	21 LT	21 LT	21 LT	21 LT
PHTHALATES				
Dimethyl Phthalate	2.2 LT	2.2 LT	2.2 LT	2 LT
Diethyl Phthalate	5.9 LT	5.9 LT	5.9 LT	6 LT
Di-N-Butyl Phthalate	33 LT	33 LT	33 LT	33 LT
Butylbenzyl Phthalate	28 LT	28 LT	28 LT	28 LT
Bis (2-Ethylhexyl) Phthalate	7.7 LT	7.7 LT	7.7 LT	8 LT
Di-N-Octyl Phthalate	1.5 LT	1.5 LT	1.5 LT	2 LT
POLYNUCLEAR AROMATICS				
Naphthalene	0.5 LT	0.5 LT	0.5 LT	1 11
2-Methylnaphthalene	1.3 LT	1.3 LT	1.3 LT	1 LT
2-Chloronaphthalene Acenaphthylene	2.6 LT 5.1 LT	2.6 LT 5.1 LT	2.6 LT 5.1 LT	3 LT 5 LT
Acenaphthene	5.8 LT	5.1 LT	5.8 LT	6 LT
Fluorene	9.2 LT	9.2 LT	9.2 LT	9 LT
Phenanthrene	9.9 LT	9.9 LT	9.9 LT	10 LT
Anthracene	5.2 LT	5.2 LT	5.2 LT	5 LT
Fluoranthene Pyrene	24 LT	24 LT 17 LT	24 LT 17 LT	24 LT 17 LT
Benzo [A] Anthracene	9.8 ND	9.8 ND	9.8 ND	10 ND
Chrysene	7.4 LT	7.4 LT	7.4 LT	7 LT
Benzo [B] Fluoranthene	10 LT	10 LT	10 LT	10 LT
Benzo K Fluoranthene	10 LT	10 LT	10 LT	10 LT
Benzo [A] Pyrene	14 LT 21 LT	14 LT	14 LT	14 LT
Indeno [1,2,3-C,D] Pyrene Dibenz [A,H] Anthracene	21 LT 12 LT	21 LT 12 LT	21 LT 12 LT	21 LT 12 LT
Benzo [G,H,I] Perylene	15 LT	15 LT	15 LT	15 LT
SULFUR CONTAINING	15 LT		15 LT	7F TT
4-Chlorophenylmethyl Sulfoxide 4-Chlorophenylmethyl Sulfide	15 LT 10 LT	15 LT 10 LT	15 LT 10 LT	15 LT 10 LT
4-Chlorophenylmethyl Sulfone	5.3 LT	5.3 LT	5.3 LT	5 LT
OTHER		77 17	07.17	AT 11
1,4-Oxathiane Bis (2-Chloroethyl) Ether	27 LT 0.68 LT	27 LT 0.68 LT	27 LT 0.68 LT	27 LT 1 LT
Dicyclopentadiene	5.5 LT	5.5 LT	5.5 LT	6 LT
Benzyl Alcohol	4 LT	4 LT	4 LT	4 LT
Bis (2-Chloroisopropyl) Ether	5 LT	5 LT	5 LT	5 LT
Dithiane Hexachloroethane	3.3 LT	3.3 LT 8.3 LT	3.3 LT 8.3 LT	3 LT
Dibromochloropropane	8.3 LT 12 LT	8.3 LT 12 LT	8.3 LT 12 LT	8 LT 12 LT
Isophorone	2.4 LT	2.4 LT	2.4 LT	2 LT
Bis (2-Chloroethoxy) Methane	6.8 LT	6.8 LT	6.8 LT	7 LT
Benzoic Acid	3.1 ND	3.1 ND	3.1 ND	3 ND
4-Chloroaniline	1 ND	1 ND 54 LT	1 ND	1 NO
Hexachlorocyclopentadiene 2-Nitroaniline	54 LT 31 ND	54 LI 31 ND	54 LT 31 ND	54 LT 31 ND
3-Nitroaniline	15 LT	15 LT	15 LT	15 LT
4-Chlorophenylphenyl Ether	23 LT	23 LT	23 LT	23 LT
4-Nitroaniline	31 ND	31 ND	31 ND	31 ND
1,2-Diphenylhydrazine	13 LT	13 LT	13 LT	13 LT
2,6-Dinitroaniline	8.8 LT	8.8 LT	8.8 LT	9 LT
4-Bromophenylphenyl Ether 3,5-Dinitroaniline	22 LT 21 LT	22 LT 21 LT	22 LT 21 LT	22 LT 21 LT
Hexachlorobutadiene	8.7 LT	8.7 LT	8.7 LT	9 LT
3,3'-Dichlorobenzidine	°.5 LT	5 LT	5 LT	5 LT
TOTAL OVOC				
TOTAL SVOC Collection Date:	0 26-Feb-93	0 24-Feb-93	0 26-1-eb-93	0 26-Feb-93
Extraction Date:	07-Mar-93	07-Mar-93	07-Mar-93	07-Mar-93
Analysis Date:	07-Mar-93	07-Mar-93	07-Mar-93	07-Mar-93
NOTES:				

NOTES: (1) LT= Less than detection limits; ND= Not detected

Appendix M: Soldiers Lake Analytical Results

Table SL-1: Metals in Surface Water from Soldiers Lake
Table SL-2: Pesticides in Surface Water from Soldiers Lake

Note: The term "LT" indicates that a certified analyte is not detected. The term "ND" is used for analytes that are added to certified methods but have not gone through the certification process. The term "LT" is followed by the certified reporting limit, it does not signify that a compound was actually detected but not included because results were below the Contract Required Detection Limit.

TABLE SL-1: Metals in Surface Water from Soldiers Lake Fort George G. Meade, Maryland Page 1 of 1

Site ID Field Sample ID	SLSW-1 S1K0001Y LAKE	SLSW-2 S1K0002Y LAKE	94QC-455 Q1KD455Y LAKE
Site Type	LANE	DAKE	DANE
Start Depth (ft)	0.5	0.5	0.5
End Depth (ft)	CSW	CSW	CSW
Total/Dissolved	Total	Total	Total
	Total	iolai	Dup. of SLSW-2
QC Type			Dup. of SLSW-2
METALS (ug/L)			
Aluminum	119	143	152
Antimony	60 LT	60 LT	60 LT
Arsenic	2.35 LT	2.35 LT	2.35 LT
Barium	68	58.1	58.5
Beryllium	1.12 LT	1.12 LT	1.12 LT
Boron	230 LT	230 LT	230 LT
Cadmium	6.78 LT	6.78 LT	6.78 LT
Calcium	22800	19600	19200
Chromium	16.8 LT	16.8 LT	16.8 LT
Cobalt	25 LT	25 LT	25 LT
Copper	18.8 LT	18.8 LT	18.8 LT
Iron	502	498	501
Lead	4.47 LT	4.47 LT	4.47 LT
Magnesium	5150	4360	4330
Manganese	120	114	112
Mercury	0.1 LT	0.1 LT	0.1 LT
Molybdenum	52.7 LT	52.7 LT	52.7 LT
Nickel	32.1 LT	32.1 LT	32.1 LT
Potassium	3610	3320	2560
Selenium	2.53 LT	2.53 LT	2.53 LT
Silver Sodium	10 LT 93000	10 LT 44900	10 LT 43300
Tellurium			
Thallium	118 LT 125 LT	118 LT 125 LT	118 LT
			125 LT
Tin Vanadium	59.9 LT	59.9 LT	59.9 LT
Vanadium 1 Zinc	27.6 LT	27.6 LT	27.6 LT 29
	32.9	25.9	29
HEAVY METALS	0	0	0
TOTAL METALS	125,402	73,019	70.243
Collection Date	19-Jan-94	18-Jan-94	18-Jan-94
Extraction Date	13-Feb-94	13-Feb-94	13-Feb-94
Analysis Date	13-Feb-94	13-Feb-94	13-Feb-94

Notes:
(1) LT - less than detection limit; ND - not detected
(2) Heavy metals include Sb,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag

TABLE SL-2: Pesticides in Surface Water from Soldiers Lake Fort George G. Meade, Maryland Page 1 of 1

Site ID Field Sample ID Site Type Start Depth (ft) End Depth (ft) Media Total/Dissolved QC Type	SLSW-1 S1K0001Y LAKE 0 0.5 CSW Total	SLSW-2 S1K0002Y LAKE 0 0.55 CSW Total	94QC-455 Q1KD455Y LAKE 0 0.5 CSW Total Dup. of SLSW-2
PESTICIDES (ug/L)			
alpha-BHC beta-BHC Lindane Chlordane delta-BHC Heptachlor Aldrin Isodrin Heptachlor Epoxide Toxaphene Endosulfan I p,p'-DDE Dieldrin Endrin Endrin Endrin Endrin Endrin p,p'-DDD Endosulfan II p,p'-DDT Endrin Aldehyde Methoxychlor	0.003 LT 0.01 LT 0.008 0.031 LT 0.003 LT 0.003 LT 0.007 LT 0.003 0.006 LT 1.64 LT 0.003 LT 0.004 LT 0.007 LT 0.008 LT 0.008 LT 0.008 LT 0.008 LT 0.003 LT 0.005 LT 0.005 LT	0.003 LT 0.001 LT 0.006 0.031 LT 0.003 LT 0.003 LT 0.006 0.006 0.006 LT 1.64 LT 0.003 LT 0.004 LT 0.004 LT 0.004 LT 0.008 LT 0.008 LT 0.008 LT 0.008 LT 0.008 LT 0.005 0.05 LT	0.003 LT 0.01 LT 0.006 0.031 LT 0.003 LT 0.003 LT 0.005 0.006 LT 1.64 LT 0.003 LT 0.004 LT 0.007 LT 0.008 LT 0.008 LT 0.008 LT 0.008 LT 0.008 LT 0.008 LT 0.004 0.05 LT
Collection Date Extraction Date	19-Jan-94 26-Jan-94	18-Jan-94 24-Jan-94	18-Jan-94 24-Jan-94
Analysis Date	02-Feb-94	26-Jan-94	26-Jan-94

Notes: (1) LT - less than detection limit; ND - not detected

Appendix N: Background Soil and Quality Control Analytical Results

Table BKG-1: Metals in Background Soils
Table BKG-2: Pesticides in Background Soils

Table QC-1: Trip Blanks for Fort George G. Meade, Maryland

TABLE BKG-1: Metals in Background Solis Fort George G. Meade, Maryland Page 1 of 4

Site Type Start Depth (it bgs) End Depth (it bgs) Media Closest Site METALS (ug/g)	B140m1V	BYACOOSY	BKG3	BKG-27	BKG-28	BKG-4	BKG-5	BKG-6	BKG-31
Start Depth (it bgs) End Depth (it bgs) Media Closest Site	A P	AHOL	AHOL	AHO	AHOI	AHO AHO	AHC	AHOI	FIACOSTY AHOL
End Depth (ft bgs) Media Closest Site METALS (ug/g)	0	0	0	2	2	2	3	5	<u> </u>
Media Closest Site METALS (ug/g)	က	က	က	က	m	ım	ım	ı m	ım
Closest Site METALS (ug/g)	တ္တ	တ္တ	တ္တ	8	တ္တ	8	8	8	83
METALS (ug/g)	ODA	ODA	AQO A	ODA	8	GFD	CFD	CFD	CFD
A	7000	00107	0000	00007					
Aluminum	_	1000	_	_	_	10300		_ `	
Arsenic	3.5	19.6 2.86	19.6 1.	19.6 LI	19.6 LT	19.6 LT	19.6 LT	19.6 LT	19.6 LT
Barium		36.6		33.7	248	200	53.1	2.5	_
Beryllium	0.427 LT	0.427 LT	0.427 LT	0.427 LT	_	0.427 LT	1.08	- 8	0.427 LT
Boron	12.9	11.8			_	1.1		121	_
Cadmium	1.2 LT	1.2 LT	1.2 LT		1.2 LT	1.2 LT	1.2 LT	1.2 LT	
Calgum	30.0 10.0 10.0	විද්	95.55 5.55	42.5	_	25.3 LT	34.4	25.3 LT	_
Curomium		13.6	10.3			18.2	40.2	49.5	
Cobalt	2.5 LT	3.55	2.5 LT	2.5 LT	2.5 LT	2.97	4.96	2.5 LT	2.5 LT
and and and and and and and and and and	8. 6	5.33	7.84 L	99.7	12.3	3 9.	16.3	22.8	_
<u>101</u>	5290	10400	5250	12500	21800	16300	42200	51900	3950
Managina	5.16 05.0	5.42		7.05	6.61	45.5	6.69 600	7.56	1.36
Ivagilesonii	6/2	9 6	2 7	200		8	8	2	= :
Manganese		623	5. C.		9.87	20.6	_	16.8	
Makhabaim		3.5	3.5	200		0.00	3.5	9 5	
Nickel	14.5 LT	14.5 1.0 1.1	14.3	_		14.3		14.3	
Potassium	217	555	351	88		2.86 438	48	20.0	2./4 LT
Selenium	_	0.449 LT	0.449 LT	_	_	T 0449	_	TI 677	_
Silver	_	_	0.803 LT	_		0.803 LT	0.803	0.803 LT	_
Sodium	_	38.7 LT	38.7 LT	_	_	38.7 LT			_
Tellunum	14.9 LT	14.9 LT	14.9 LT	14.9 LT	14.9 LT	14.9 LT	14.9 LT	14.9 LT	
			25.			25.			
	_		24.7	_		7.43	_	_	_
Variadum	7 8	2.5.5 5.00	4.0.0	9.9 • • • • • • • • • • • • • • • • • • •	5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5	28.3	- 6	5	98.7
2	†	0.00	4.21	1	7.	<u>4</u>	21.3	12	3.83
Heavy Metals	13	8	24	27	8	32	61	R	5.7
Grand Total Metals	10656	22526	14554	23976	31259	27741	69750	72896	5342
Collection Date	26-Jan-93	26-Jan-93	26-Jan-93	18-Jan-94	18-Jan-94	28-Jan-93	28-Jan-93	28-Jan-93	24-Jan-94
Extraction Date	18-1-60-93	18-1-60-63	18-rep-93	03-rep-94	03-Feb-94		18-Feb-93	18-Feb-93	03-Feb-94
Analysis Date	11-Mar-93	11-Mar-93	11-Mar-93	12-Feb-94	12-Feb-94	11-Mar-93	11-Mar-93	11-Mar-93	12-Feb-94

(1) LT - less than detection limit; ND - not detected (2) it bgs - feet below ground surface (3) it bay metals include Sb, As, Be, Cd, Cr, Pb, Hg, Ni, Se, Ag

Signal Si	Ole ID	BKG-7	BKG-8	94G-9	8KG-15	BKG-11	BKG-12	BKG-13	BKG-14
Signature Color	Field Sample ID	B1A0007Y	B1A0008Y	B1A0009Y	B1A0010Y	B1A0011Y	B1A0012Y	B1A0013Y	B1A0014Y
The color of the	odki gir	₹ 5	AHOL	A PC	A-C	A P O L	A P P	AHO,	AHOL
Sign CSO	Start Deptin (It bgs)	2	2	~	7	2	~	~	8
Sign	End Deptin (it ogs)	چ	n (e (e 6	e (6	e (6	က	e (6
Scueyo) Agro 11400 8240 7580 1910 27400 2560 m 4970 11400 8240 7580 196 LT 196 LT 196 LT 196 LT 196 LT 25 LT 12 LT <th>Neoria City</th> <th>3</th> <th>3</th> <th>3</th> <th>3</th> <th>3</th> <th>3:</th> <th>3 i</th> <th>3</th>	Neoria City	3	3	3	3	3	3:	3 i	3
S (ue)g) 11400 8240 7580 1910 27400 2380 2380 2380 248 248 25 1 2	Ciosest Site	¥ F	AHH	HHA	21	11.2	[2	FTA	FIA
w 4970 11400 8240 7560 1910 27400 296 IT 196 IT </th <th>METALS (ug/g)</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	METALS (ug/g)								
w 4970 11400 8240 7560 1910 27400 2860 y 987 11400 8240 7560 1910 27400 286 1 25 LT <									
y 196 T 197 T 197	Aluminum		11400		7580			2962	
12.9 24.0 25.5 1	Antimony		19.6 LT		19.6 LT			19.6 LT	19.6 LT
12.5 12.5 13.5 14.5		9.07	24.0		7.5 L	_		7.5 LI	_
March Marc	Banum		•		142		8	1.3	28 - 29
To be compared by the compar	Born		_	_	0./51 24.0		2.27	0.427 LI	_
124 125 127 1916 112 177 1916 112 177 1916 112 177 1916 112 177 1916 112 177 1916 112 177 1916 112 177 1916 112 177 1916 112 1916 192	Codmittee		_		F1.6.				0.7
124 124 181 106 112 1770 636	Cadillidii			_	7.7	_		7.25	_
1.5	Chamin	25	75.0	400	906	20.	2/2	63.3	ام د ب
1.50			_	2.0	9.0	7.1.	3.5	0.30	
sign 450 550 460 550 134 254 170 sign 359 550 1136 563 124 170 196 sign 477 457 489 476 511 3200 389 313 196 170 389 170 <th>Cobair</th> <th></th> <th></th> <th>20.2</th> <th>80.7</th> <th>8.5</th> <th>18.2</th> <th>2.5 11</th> <th>25 17</th>	Cobair			20.2	80.7	8.5	18.2	2.5 11	25 17
19500 1950	and a	40.4	8.53	8. j	2.0	80.	13.4	2.84 L	
1.50 1.50	lron	19500	32600	88	9200	1800	29200	4770	
116	Lead	3.59	5.36	4.17	13.5	5.63	12.4	8:	
1.6 9.87 1.1 6.26 1.300 95.9 1.290 31.3 1.290 31.3 1.290 31.3 1.290 31.3 1.290 31.3 1.290 31.3 1.43 1.7 31.3 1.43 1.7 31.3 1.43 1.7 31.3 31.3	Magnesium	202	•	688	4760	211	3200	586	
14.3 17 14.3 18.5	Manganese	11.6			1300			31.3	
14.3 L 14.3	Mercury		_		50.0	_ `			
131 133 14 337 159 31 199 2.74 1 1 1 1 1 1 1 1 1	Molyboenum		_	_	14.3 LT	_			14.3 LT
Metals 28-Jan-93 18-Feb-	Noxel Potassiim		_	6.13 408	3.97	1.65	19.9	_	5.16
Control Cont	Colonium		_		1		Ī	110770	_
Metals 28-Jan-93 28-Jan-93 28-Jan-93 28-Jan-93 28-Jan-93 18-Feb-	Silver				0.803			0.803	0.803 LT
24.3 LT 14.9 L	Sodium	_	_	_	7 68	_		38.7 LT	_
34.3 LT 34.3 L	Tellurium		_	_	14.9 LT	_	_	14.9 LT	
7.43 LT 7.70 LT 8.79 LT 7.07 7.0	Thallium		_	_	34.3 LT	_	_	34.3 LT	
28.7 31.7 14.6 50.7 14.4 41.8 8.79 8.79 8.79 8.79 8.79 8.79 8.79 8.	급:		_	_	7.43 LT	_		7.43 LT	
5.66 7.5 13.4 14 9.59 60.6 7.07 26 48 21 29 20 68 8.3 24906 45154 16329 43780 14374 64601 8501 8 28-Jan-93 28-Jan-93 28-Jan-93 28-Jan-93 28-Jan-93 18-Feb-93 18-Feb-93 18-Feb-93 18-Feb-93 18-Feb-93 18-Feb-93 18-Feb-93	Vanadium	28.7	31.7	14.6	20.7	14.4	41.8	8.73 25.83	15.4
26 48 21 29 20 68 \$ 24906 45154 16329 43780 14374 64601 \$ 28-Jan-93 28-Jan-93 28-Jan-93 28-Jan-93 28-Jan-93 \$ 18-Feb-93 18-Feb-93 18-Feb-93 18-Feb-93	Zinc	2.66	7.5	13.4	14	9:20	9.09	7.07	16.6
28-Jan-93 28-Jan-93 28-Jan-93 28-Jan-93 28-Jan-93 18-Feb	Heavy Metals	8	48	21	8	8	88	80	23
28-Jan-93 28-Jan-93 28-Jan-93 28-Jan-93 28-Jan-93 18-Feb	Grand Total Metals	24906	45154	16329	43780	14374	64601	8501	17709
18-Feb-93 18-Feb	Collection Date	28-Jan-93	28-Jan-93	28-Jan-93	28-Jan-93	28-Jan-93	28-Jan-93	28-Jan-93	28-Jan-93
44 May 02 44 May 02 44 May 02 44 May 02	Extraction Date	18-Feb-93	18-Feb-93	18-Feb-93	18-Feb-93	18-Feb-93	18-Feb-93	18-Feb-93	18-Feb-93
	Analysis Date	11-Mar-93	11-Mar-93	11-Mar-93	11-Mar-93	11-Mar-93	11-Mar-93	11-Mar-93	11-Mar-93

TABLE BKG-1: Metals in Background Solls Fort George G. Meade, Maryland Page 2 of 4

(1) LT - less than detection limit; ND - not detected (2) it bgs - feet below ground surface (3) it bas - feet below ground surface (3) Heavy metals include Sb, As, Be, Cd, Cr, Pb, Hg, Ni, Se, Ag

TABLE BKG-1: Metals in Background Solis Fort George G. Meade, Maryland Page 3 of 4

Site ID Field Sample ID Site Type	BKG-16 B1A0016Y AHOL	BKG-17 B1A0017Y AHOL	BKG-18 B1A0018Y AHOL	BKG-22 B1A0022Y AHOL	B1A0023Y AHOL	B1A0019Y AHOL	B1A0020Y AHOL	B1A00217 AHOL	BKG-29 B1A0029Y AHOL	B1A0030Y AHOL
Start Depth (ft bgs) End Depth (ft bgs) Media	~ E O S	~ E Q }	~~Q % %	% ® Q & Ø	089 8 08 8 08 8	0898 0898	083 8 80 3 8	08.2 08.2	% E & &	~ ~ & &
METALS (ug/g)	3	3	5	180	S	ASI	ASE	AST.	ASE.	ASE
Aluminum	999	2700	4350	9230	3380	4610	4330	1650	3600	5380
Antimony	19.6 LT	19.6 LT	19.6 LT		19.6 LT	19.6 LT	19.6 LT	_	19.6 LT	_
Arsenic	2.5 LT	2.5 LT	2.83	2.5 LT	_	2.5 LT	_	2.5 LT	2.5 LT	_
Barum										
Boron	6.64	6.64 LT		6.64 LT	6.64 LT	664 LT	6.64	6.64	6.64 LT	664 LT
Cadmium			_		_		_	_	_	
Calcium	52.3	52	25.3 LT	38.5						
Cobalt	25 LT	2.5 LT		4.74		2.5 LT	2.5 LT	2.5 LT		
Copper				6.28	2.84 LT	4.93		3.65	2.84 LT	2.84 LT
no.	26500	11100	18400	16300	5370	7580	0699	4990	6100	8570
Lead	5.11	3.94 554	7.64 23.0	5.27 720	2.54 269	3.13 385	2.72 367	% % %	2.93 34	3.04 4.05
Manganese				47.9						
Mercury					_	_	_	_	_	_
Molybdenum	14.3 LT	14.3 LT		14.3 LT		14.3 LT	14.3			
Potassium			_	350			_			
Selenium	0.449 LT 49 LT	0.449 LT	0.449 LT	0.449 LT	0.449 LT					
Soofing										
Tellurium	_			_		_			_	
Thallium	34.3 LT	34.3	_	_	_	_	_	_	_	_
드	_		_	_	_	_	_	_	_	_
Vanadium	88.5	16.2	16.4 0.25	8.5	8.25	12.1	12	ه د د	9.51	15.8
ZIIIC	2.0	13.7	0.63	2.1.2	0.0	0.27	70.7	3.02	ō	9.60
Heavy Metals	8	13	æ	24	8.7	9.5	8.1	0.9	9.5	4
Grand Total Metals	34089	19778	23262	26801	9267	12944	11733	6849	10143	14388
Collection Date	02-Feb-93	02-Feb-93	02-Feb-93	18-Jan-94	18-Jan-94	02-Feb-93	02-Feb-93	02-Feb-93	24-Jan-94	24-Jan-94
Extraction Date	02-Mar-93	02-Mar-93	02-Mar-93	40-00-00	Ľι	02-Mar-93	02-Mar-93	02-Mar-93	45 191 04	40 101 04
Analysis Date	4-Mar-93	14-Mar-93	14-Mar-93	12-Feb-34	7-1-60-34	14-Mar-93	14-Mar-93	14-Mar-93	12-1-60-34	7-1-00-7-7

(1) LT - less than detection limit; ND - not detected (2) it bgs - feet below ground surface (3) Heavy metals include Sb,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag

TABLE BKG-1: Metals in Background Solls Fort George G. Meade, Maryland Page 4 of 4

Field Sample ID Site Type	B1A0024Y AHOL	B1A0025Y AHOL	81A	B1A0026Y AHOL	
Start Depth (ft bgs) End Depth (ft bgs) Media Closest Site	cso ₃ 2	୯୧୧୧		SS32	
METALS (ug/g)					
Aluminum	4010	3790		3520	
Antimony	19.6 LT		5	19.6	5
Arsenic		4.62		() () ()	5
Beryllium	0.427 LT	14.4 0.427 L	ь	0.427	5
Boron	6.64 LT		5	6.64	
Cadmium			-	1.2	5
Chromium	27.8	8 55 G		8 8 8	
Cobalt	2.5 LT		5	5 5	5
Copper				2.84	5
<u> </u>	0269	7010		7590	
Lead		2.89		6.34	
Magnesium	E/8	9 5		£ 3	
Manganese Merciry	32.2	35.3	F	9 c	۲
Molybdenum	143		. 1-	14.3	<u>;</u>
Nickel			: <u>-</u> -	2.74	1
Potassium			:5	292	i
Selenium	0.449 LT	0.449	5	0.449	ᆸ
Silver			5	0.803	5
Sodium		38.7	<u> </u>	38.7	5
Thelim	14.9 LT		<u></u>	0.45	יב
Tisamum Tis		2 6	<u>- !</u>	9 t	::
Vanadiim			5	3.0	_
Zinc	8.72	10.05 12.05		23.0	
Heavy Metals	4	16		8	
Grand Total Metals	11786	11213		11988	
Collection Date Extraction Date	19-Jan-94 03-Feb-94	19-Jan-94 03-Feb-94	ද සි	19-Jan-94 03-Feb-94	
Applying Date	40 Eab 04	40 Fob 04	Ç	CO Eat OA	

(1) LT - less than detection fimit; ND - not detected (2) ft bgs - feet below ground surface (3) Heavy metals include Sb,As,Be,Cd,Cr,Pb,Hg,Ni,Se,Ag

TABLE BKG-2: Pesticides in Background Solis Fort George G. Meade, Maryland Page 1 of 4

Field Sample ID Site Type Start Death (# bos)	BKG-1 B1A0001Y AHOL	BKG-2 B1A0002Y AHOL	BKG-3 B1A0003Y AHOL	BKG-27 B1A0027Y AHOL	BKG-28 B1A0028Y AHOL	BKG-4 B1A0004Y AHOL	B1A0005Y AHOL	BYG-6 B1A0006Y AHOL	B1A0031Y AHOL
Closest Sie	Se oo	CSO 9	OSC 3 C	CSO 3 5	000 3 2 00 4	58°3 2	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	000 g	~ ° 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
PESTICIDES/PCB COMPOUNDS (ug/g)) 	5
alpha-BHC	0.003 LT	_	-			0.003 LT	0.003 LT	_	
beta-BHC defta-BHC	0.006 LT	0.008 LT	0.008 LT	0.008 LT	0.008 LT	0.008 LT	0.008		
Lindane	D.001 LT	_				0.000	0.00		
Heptachlor	0.002 LT	_		0.002 LT		0.002 LT	0.002		
Aldrin Endoc: Man I						0.001 LT	0.001 LT	_	
Dialdrin	0.001						0.001 LT		
EO-C'd'd			0.002	0.002		0.002 0.003 1.T	0.002 LT		
Endrin		_			_	_	0.007		
Endosulian II	0.001 LT	_	0.001 LT		_	0.001 LT	0.001		
COO-d'd		_			_	_	0.003 LT		
100-4-9			0.009		_		0.004 LT	_	
Metroxychlor	0.036						0.036 LT	_	
Heotachlor Fooxide	2000		0.00	0.003		0.003		_	
Chlordane	0.00	0.068	0.068	0.068	0.068	0.068 LT	0.068	0.068	0.00
Collection Date		-			_		_		
Extraction Date	02-Feb-93	02-Feb-93	02-Feb-93	24-bn-94	24-lan-94	20-Jan-93	28-Jan-93	28-Jan-93	24-Jan-94
Analysis Date	15-Feb-93	15-Feb-93	15-Feb-93	28-Jan-94	28-Jan-94	15-Feb-93	15-Feb-93	15-Feb-93	09-Feb-94

Site ID Field Sample ID	B1A0007Y	BKG-8 B1A0008Y	BKG-9 B1A0009Y	BKG-10 B1A0010Y	BKG-11 B1A0011Y	BKG-12 B1A0012Y	BKG-13 B1A0013Y	BKG-14 B1A0014Y
Site Type Start Depth (it bgs) End Depth (it bgs)	¥ 2	₩ ₩	AHOL 2 2	AHO,	AHOL 3	AHOL 2	AHOL 2 2 4	AHOL 7
Media Closest Site	°S≨ ¥	CSO	°SS H HH	CSO IL2	cso II2	s CSO IL2	‱ HA	SSO AT
PESTICIDES/PCB COMPOUNDS (ug/g)								
alpha-BHC	0.003 LT			0.003 LT	T1 8000	_	T1 8000	
beta-8HC	0.008 LT	0.008 LT	0.008	0.008 LT	0.008 LT	0.008 LT	1 8000	0.008
deta-BHC	0.008 LT			0.008 LT	0.008 LT	_	0.008 LT	
Lindane	0.001 LT			0.001 LT	0.001 LT	_	_	
Heptachlor	0.002 LT			0.002 LT	0.002 LT	_	0.002 LT	
Aldrin	0.001 LT			0.001 LT	0.001 LT	_	_	
Endosulfan i	0.001 LT	0.001 LT		0.001 LT	0.001 LT	_	_	
Dieldrin	0.002 LT			0.002 LT	0.002 LT	_	_	
p,pD0E	0.003 LT	0.016		0.003 LT	0.003 LT	_	0.003 LT	
Endrin	0.007 LT	_		0.007 LT	0.007 LT	0.007 LT	0.007 LT	
Endosulfan II	0.001 LT	0.001 LT		0.001 LT	_	_	0.001 LT	
QQQ-d'd	0.003 LT			0.003 LT	0.003 LT	0.003 LT	0.003 LT	0.003 LT
TOO-q'd	9000	0.016		0.011	0.004 LT		0.007	
Methoxychlor	0.036 LT		0.036 LT	0.036 LT	0.036 LT	0.036 LT	0.036 LT	0.036 LT
Isodin	0.003 LT			0.003 LT	0.003 LT		0.003 LT	_
Heptachlor Epoxide	0.001 LT			0.001 LT	0.001 LT		0.016	0.003
Chlordane	0.068 LT	0.068 LT	0.068 LT	0.068 LT	0.068 LT	0.068 LT	0.068 LT	0.068 LT
loxaphene	0.226 LT		- 1	0.226 LT	0.226 LT		_ i	
Collection Date	28-Jan-93	28-Jan-93	28-Jan-93	28-Jan-93	28-Jan-93	28-Jan-93	28-Jan-93	28-Jan-93
Extraction Date 02-Feb-93	02-Feb-93	02-Feb-93	02-Feb-93	02-Feb-93	02-Feb-93	02-Feb-93	02-Feb-93	02-Feb-93
Analysis Date	15-Feb-93	15-Feb-93	15-Feb-93	15-Feb-93	15-Feb-93	15-Feb-93	15-Feb-93	15-Feb-93

TABLE BKG-2: Pesticides in Background Solis Fort George G. Meade, Maryland Page 2 of 4

TABLE BKG-2: Pesticides in Background Solis Fort George G. Meade, Maryland Page 3 of 4

Site ID Field Sample ID	B1A0016Y	BKG-17 B1A0017Y	BKG-18 B1A0018Y	BKG-22 B1A0022Y	BKG-23 B1A0023Y	BKG-19 B1A0019Y	BKG-20 B1A0020Y	BKG-21 B1A0021Y	BKG-29 B1A0029Y	BKG-30 B1A0030Y
Sife Type Start Depth (ft bgs) End Depth (ft bgs)	₹ 0 0 0 0 0 0	APO 2 2 2	¥ 0 ° °	AHOL 3 2	AFOL 3 2	AHOL 3 2	APC.	AHOL 3 2	AHOL 2	AHOL 3
Media Closest Site	SS \ SS \ SS \ SS \	CSO DS√	CSO DSY	CSO DSY	CSO DSY	SS S	CSO. ASL	SS. Ast	CSO ASL	SS &
PESTICIDES/PCB COMPOUNDS (ug/g)										
alpha-BHC	0.003 LT	0.003 LT	0.003		0.003 LT	0.003 LT	0.003 LT	. 0.003 LT	0.003 LT	0.003
beta-BHC	0.008 LT	_	0.008		0.008 LT	0.008 LT	0.008 LT	. 0.008 LT	0.008 LT	0.008 LT
delta-BHC	0.008 LT	_	900'0		0.008 LT	0.008 LT	0.008 LT	. 0.008 LT	0.008 LT	0.006 LT
Lindane	1000	0.001 LT	0.001			0.001 LT	0.001	. 0.001 LT	0.001 LT	0.001
Heptachlor	0.002				_	0.002 LT	0.002	. 0.002 LT	0.002 LT	0.002 LT
Aldrin	0.001	0.001	0.001		0.001 LT	0.001 LT	0.001 LT	. 0.001 LT	0.001 LT	0.001 LT
Endosultan	0.001			0.001 LT	_	0.001 LT	0.001 L1	0.001 LT	0.001 LT	0.001
Dedan	0.002	0.002		0.002 LT	0.002 LT	0.002 LT	0.002 LT	0.002 LT	0.002 LT	0.002 LT
P.PDO:	0.003	0.003 LT	0.003	0.003 LT	_	0.003 LT	0.003 LT	0.003 LT	0.003 LT	0.003
Endrin	0.007	0.007 LT			_	0.007 LT	0.007 LT	_ 0.007 LT	0.007 LT	0.007 LT
Endosultan II		0.001			_	0.001 LT	0.001	_ 0.001 LT	0.001 LT	0.001
000-d'd	0.003 LT	0.003	0.003		0.003 LT	0.003 LT	0.003	0.003 LT	0.003 LT	0.003
100-d'd	0.004 LT		0.00	0.004 LT	_	0.004 LT	0.004	D.004 LT	0.004 LT	0.004
Methoxydhlor	0.036	0.036 LT	0.036	0.036 LT	0.036 LT	0.036 LT	0.036 LT	0.036 LT	0.036 LT	0.036
Soon	0.003		0.003	0.003	0.003	0.003	0.003	0.003 LT	0.003 LT	0.003
Heptachior Epoxide	0.001		0.001	0.001 LT	0.001 LT	0.001	0.001	0.001 LT	0.001 LT	0.001 LT
Chlordane	0.068	0.068	0.068	0.068 LT	0.068 LT	0.068 LT	0.068	0.068 LT	0.068 LT	0.068
וטאמא יפויפ	0.220		0.2.0	0.22b LI	0.226	0.226	0.226 LI	0.226 LI	0.226 LI	0.226 LI
Collection Date	02-Feb-93	02-Feb-93	02-Feb-93	18-Jan-94	18-Jan-94	02-Feb-93	02-Feb-93	02-Feb-93	24-Jan-94	24-Jan-94
Extraction Date	04-Feb-93	04-Feb-93	04-Feb-93	24-Jan-94	24~ban-94	04-Feb-93	04-Feb-93	04-Feb-93	31-Jan-94	31-Jan-94
Analysis Date 12-Fe	12-Feb-93	12-Feb-93	12-Feb-93	28-Jan-94	28-Jan-94	12-Feb-93	12-Feb-93	12-Feb-93	09-Feb-94	09-Feb-94

3-2: Pesticides in Background Soils	G. Meade, Maryland
TABLE BKG-	Fort George G Page 4 of 4

Sire ID	BKG-24		BKG-25		BKG-26	
Field Sample ID	B1A0024Y		B1A0025Y		B1A0026Y	
Site Type	A P D		A A A		AHOL	
Start Depth (ft bgs)	2		2		2	
End Depth (ft bgs)	6		က		က	
Media	တ္တ		SS		SS	
Closest Site	정		ଅ		ઝ	
A STATE OF THE STA						
PESTICIDES/PCB COMPOUNDS (ug/g)						
alpha-BHC	0000	-	0.003	۲	0000	۲
beta-BHC	0000	·	0.008	-	0000	<u></u>
delta-BHC	800.0	,	0.008	-	0.008	5
Lindane	0.001	Ε.	0.001	Η,	0.001	5
Heptachlor	0.002	۲.	_	-	0.002	5
Aldrin	0.001	-	_	Ь	0.001	5
Endosulfan I	0.001	-	_	Ε.	0.001	٥
Dieldrin	0.002	Ε.	_	5	0.002	٥
Dop-d'd	0.003	Η.	_	Η,	0.003	5
Endrin	0.007	۲,	_	5	0.007	5
Endosulfan II	0.00	-	_	-	0.001	۲
000-d'd	0.003	_	_	Ь	0.003	۲
p,p'-DOT	0.00	<u> </u>	_	5	0.004	L
Methoxychlor	0.036	_	_	5	0.036	L
Isodrin	0.003	-	_	5	0.003	5
Heptachlor Epoxide	0.00	-	_	5	0.001	
Chlordane	0.068	<u>_</u>	0.068	5	0.068	5
Toxaphene	0.226	اظ	-1	<u>-</u>	0.226	늬
Collection Date	19-Jan-94		19-Jan-94		19-Jan-94	
Extraction Date	26-Jan-94		26-Jan-94		26-Jan-94	
Analysis Date	\$1 de 1 de 1		35 - FES-185		25-16-15E	

TABLE QC-1: Trip Blanks for Fort George G. Meade, Maryland Page 1 of 3 $\,$

Site Location ID	93QC-300	93QC-301	93QC-302	93QC-350	93QC-351	93QC-352
Field Sample ID	Q1XT300Y	Q1XT301Y	Q1XT302Y	Q1XT350Y	Q1XT351Y	Q1XT352Y
Site Type	TRIP	TRIP	TRIP	TRIP	TRIP	TRIP
Media	CSW	CSW	CSW	CSW	CSW	CSW
Associated COC Number	7	10	11/12	15/16	18/19	20/21
Associated Areas	HHA	ASL	ASL	FTA	DSY/ODA	ODA/CFD
QC Type	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank
VOLATILE ORGANICS (ug/L)						
AROMATICS						
Benzene	1 LT	1 LT	1 LT	1 1.17	1 LT	1 LT
Toluene	1 LT	1 1.17	1 LT	1 LT	1 LT	1 LT
Ethylbenzene	1 LT	1 LT	1 LT	1 LT	1 LT	1 LT
1,3-Dimethylbenzene / M-Xylene	1 LT	1 LT	1 LT	1 LT	1 LT	1 LT
Xylenes	2 LT	2 LT	2 LT	2 LT	2 LT	2 LT
Styrene	5 ND	5 ND	5 ND	5 ND	5 ND	5 ND
CHI ODINATED ADOMATICE				ļ		
CHLORINATED AROMATICS		1				ا ۔ ۔ ۔
Chlorobenzene	1 LT	1 1 1	1 11	1 1.	1 1.1	1 LT
Dichlorobenzene, Nonspecific	2 LT	2 LT	2 LT	2 LT	2 LT	2 LT
1,3-Dichlorobenzene	1 LT	1 LT	1 LT	1 LT	1 LT	1 LT
HALOGENATED AROMATICS		i				
Chloromethane	1.2 LT	1.2 LT	1.2 LT	1.2 LT	1.2 LT	1.2 LT
Bromomethane	14 LT	14 LT	14 LT	14 LT	14 LT	14 LT
Chloroethene / Vinyl Chloride	12 LT	12 LT	12 LT	12 LT	- 12 LT	12 LT
Chloroethane	8 LT	8 LT	8 LT	8 LT	8 LT	8 LT
Methylene Chloride	1 LT	1 LT	1 LT	1 LT	1 LT	1 LT
1,1-Dichloroethylene / 1,1-Dichloroethene	1 LT	1 LT	1 LT	1 LT	1 LT	1 LT
1,1-Dichloroethane	1 LT	1 LT	1 LT	1 LT	1 LT	1 LT
1,2-Dichloroethylenes (Cis And Trans Isomers)	5 LT	5 LT	5 LT	5 LT	5 LT	5 LT
Chloroform	1 LT	1 LT	1 LT	1 LT	1 LT	1 LT
1,2-Dichloroethane	1 LT	1 LT	1 LT	1 LT	1 LT	1 LT
1,1,1-Trichloroethane	1 LT	1 LT	1 LT	1 LT	f LT	1 LT
Carbon Tetrachloride	1 LT	1 LT	1 LT	1 LT	1 LT	1 LT
Bromodichloromethane	1 LT	1 LT	1 LT	1 LT	1 LT	1 LT
1,2-Dichloropropane	1 LT	i LT	1 LT	1 LT	1 LT	1 LT
Trichloroethylene / Trichloroethene	1 LT	i LT	1 LT	1 LT	1 LT	1 LT
1,3-Dichloropropane	4.8 LT	4.8 LT	4.8 LT	4.8 LT	4.8 LT	4.8 LT
Dibromochloromethane	1 11	1 11	1 LT	1 LT	1 LT	1 LT
1,1,2-Trichloroethane	i LT	iti	i LT	1 1.1	i LT	i LT
2-Chloroethylvinyl Ether / (2-Chloroethoxy) Ethene	3.5 LT	3.5 LT	3.5 LT	3.5 LT	3.5 LT	3.5 LT
Bromoform	11 LT	11 LT	11 LT	11 LT	11 LT	11 LT
1,1,2,2-Tetrachloroethane	1.5 LT	1.5 LT	1.5 LT	1.5 LT	1.5 LT	1.5 LT
Tetrachioroethylene / Tetrachioroethene	1 11	1 LT	1 LT	1 LT	1 LT	1 LT
Carbon Disutfide	5 ND	5 ND	5 ND	5 ND	5 ND	5 ND
Cis-1,3-Dichloropropylene / Cis-1,3-Dichloropropene	5 ND	5 ND	5 ND	5 ND	5 ND	5 ND
Trans-1,3-Dichloropropene	5 NO	5 ND	5 ND	5 ND	5 ND	5 ND
WATER SOLLIDLES	1					
WATER SOLUBLES Acetone	8 LT	8 LT	8 LT		a 17	0.17
				8 LT	8 LT	8 LT
Methylethyl Ketone / 2-Butanone	10 LT	10 LT	10 LT	10 LT	10 LT	10 LT
Methylisobutyl Ketone/4-Methyl-2-Pentanone Methyl-N-Butyl Ketone / 2-Hexanone	1.4 LT 1 ND	1.4 LT 1 ND	1.4 LT 1 ND	1.4 LT 1 ND	1.4 LT 1 ND	1.4 LT 1 ND
OTHER						=
Acrylonitrile	8.4 LT	8.4 LT	8.4 LT	8.4 LT	8.4 LT	8.4 LT
Trichlorofluoromethane	1 LT 1 ND	1 LT	1 LT	1 LT	1 LT	1 LT
Acetic Acid, Vinyl Ester / Vinyl Acetate	I ND	1 ND	1 ND	1 ND	1 ND	1 ND
Collection Date:	29-Jan-93	10-Feb-93	11-Feb-93	18-Feb-93	23-Feb-93	26-Feb-93
Extraction Date:	09-Feb-93	22-Feb-93	22-Feb-93	04-Mar-93	06-Mar-93	07-Mar-93
Analysis Date: Notes:	09-Feb-93	22-Feb-93	22-Feb-93	04-Mar-93	06-Mar-93	07-Mar-93

LT = less than detection limit; ND = Not Detected

TABLE QC-1: Trip Blanks for Fort George G. Meade, Maryland Page 2 of 3 $\,$

	93QC-353	93QC-354	93QC-355	93QC-356	93QC-357	93QC-358
Site Location ID	Q1XT353Y	Q1XT354Y	Q1XT355Y	Q1XT356Y	Q1XT357Y	Q1XT358Y
Field Sample ID	TRIP	TRIP	TRIP	TRIP	TRIP	TRIP
Site Type	csw	CSW	CSW	CSW	CSW	CSW
Media	22/23	24	25	26	27	29
Associated COC Number	ASL	ASL	ASL	ASL/DSY	ASL	ASL
Associated Areas		Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank
QC Type	Trip Blank	The blank	THE DIATIK	110 Blank	1119	
VOLATILE ORGANICS (ug/L)						
AROMATICS		4.5	4.17	1 LT	1 LT	1 LT
Benzene	1 11	1 11	1 1		ដូច	iti
Toluene	1 LT	1 11	1 LT	1 LT 1 LT	1 11	iti
Ethylbenzene	1 LT	1 LT	1 LT			1 LT
1,3-Dimethylbenzene / M-Xylene	1 LT	1 LT	1 11	1 1.1	1 LT 2 LT	2 LT
Xylenes	2 LT	2 LT	2 LT	2 LT	5 ND	5 ND
Styrene	5 ND	5 ND	5 ND	5 ND	5 ND	3 ND
CHLORINATED AROMATICS	-					
Chlorobenzene	1 LT	1 LT	1 LT	1 LT	1 LT	1 LT
Dichlorobenzene, Nonspecific	2 LT	2 LT	2 LT	2 LT	2 LT	2 LT
1,3-Dichlorobenzene	1 LT	1 LT	1 LT	1 LT	1 LT	1 LT
LIAL COFNIATED ADOMATICS						
HALOGENATED AROMATICS	1.2 LT	12 LT	1.2 LT	1.2 LT	1.2 LT	1.2 LT
Chloromethane	1.2 LT	14 LT	14 LT	14 LT	14 LT	14 LT
Bromomethane		12 LT	12 LT	12 LT	12 LT	12 LT
Chloroethene / Vinyl Chloride	12 LT	ľ	8 LT	8 LT	8 LT	8 LT
Chloroethane	8 LT	8 LT	1 LT	1 LT	ו נד	1 LT
Methylene Chloride	1 LT	1 1 1		וֹנוֹ	1 11	1 LT
1,1-Dichloroethylene / 1,1-Dichloroethene	1 LT	1 1 1		1 1.1	i LT	1 LT
1,1-Dichloroethane	1 LT	1 LT		E .	5 LT	5 LT
1,2-Dichloroethylenes (Cis And Trans Isomers)	5 LT	5 LT	5 LT		1 LT	1 LT
Chloroform	1 LT	1 LT	1 11	1 11	ן וֹ נֹין	1 1.1
1,2-Dichloroethane	1 LT	1 11	1 1.1	1 LT	낚片	1 17
1,1,1-Trichloroethane	1 LT	1 LT	1 1.1	1 LT		
Carbon Tetrachloride	1 LT	1 LT	1 LT	1 LT	1 1	1 LT
Bromodichloromethane	1 LT	1 LT	1 1.17	1 1.1	1 1	1 [
1,2-Dichloropropane	1 LT	1 LT	1 LT	1 LT	1 LT	1 LT
Trichloroethylene / Trichloroethene	1 LT	1 LT	1 LT	1 LT	1 LT	1 LT
1,3-Dichloropropane	4.8 LT	4.8 LT	4.8 LT	4.8 LT	4.8 LT	4.8 LT
Dibromochloromethane	1 LT	1 LT	1 LT	1 LT	1 LT	1 LT
1,1,2-Trichloroethane	1 LT	1 LT	1 LT	1 LT	1 LT	1 1.
2-Chloroethylvinyl Ether / (2-Chloroethoxy) Ethene	3.5 LT	3.5 LT	3.5 LT	3.5 LT	3.5 LT	3.5 LT
Bromoform	11 LT	11 LT	11 LT	11 LT	11 LT	11 LT
1,1,2,2-Tetrachloroethane	1.5 LT	1.5 LT	1.5 LT	1.5 LT	1.5 LT	1.5 LT
Tetrachloroethylene / Tetrachloroethene	1 LT	1 LT	1 LT	1 LT	1 LT	1 LT
Carbon Disulfide	5 ND	5 ND	5 ND	5 ND	5 ND	5 ND
Cis-1,3-Dichloropropylene / Cis-1,3-Dichloropropene	5 ND	5 ND	5 ND	5 ND	5 ND	5 ND
Trans-1,3-Dichloropropene	5 ND	5 ND	5 ND	5 ND	5 ND	5 ND
WATER SOLUBLES	1	1				
Acetone	8 LT	8 LT	8 LT	8 LT	8 LT	8 LT
	10 LT	10 LT	10 LT	10 LT	10 LT	10 LT
Methylethyl Ketone / 2-Butanone	1.4 LT	1.4 LT	1.4 LT	1.4 LT	1.4 LT	1.4 LT
Methylisobutyl Ketone/4-Methyl-2-Pentanone Methyl-N-Butyl Ketone / 2-Hexanone	1 ND	1 ND	1 ND	1 ND	1 ND	1 ND
OTHER	8.4 LT	8.4 LT	8.4 LT	8.4 LT	8.4 LT	8.4 LT
Acrylonitrile	8.4 L1 1 LT	0.4 LT	1 LT	1 LT	1 LT	1 LT
Trichlorofluoromethane Acetic Acid, Vinyl Ester / Vinyl Acetate	1 ND	1 ND	1 ND	1 ND	1 ND	1 ND
		02 Mor 02	04-Mar-93	18-Mar-93	22-Mar-93	24-Mar-93
Collection Date:	01-Mar-93 07-Mar-93	03-Mar-93 07-Mar-93	16-Mar-93	01-Apr-93	01-Apr-93	05-Apr-93
Extraction Date:	08-Mar-93	08-Mar-93	16-Mar-93	01-Apr-93	01-Apr-93	05-Apr-93
Analysis Date: Notes:	00 Mai-30	1 30 11100 30				

LT = less than detection limit; ND = Not Detected

TABLE QC-1: Trip Blanks for Fort George G. Meade, Maryland Page 3 of 3 $\,$

Field Sample ID CAXT359Y CAXT360Y TRIP TRIP Media Associated OCC Number Associated OCC		0000 050	00000000	6000000	
Sile Type	Site Location ID	93QC-359	93QC-360	93QC-361	93QC-362
Media					
Associated Coc Number ASL ASL ASL CFD	,,				
ASL CFD Trip Blank Trip					
CC Type					
VOLATILE ORIGANICS (ugl.) ARCMATCS Berzene Tokene 1 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1 LT 1 LT					
ARCMATICS Berzene		Прышк	THE BILLIN	THE BIATIK	THP DIGITA
Berzene	VOLATILE ORGANICS (ug/L)				
1		4 17	4 17	4.17	4 17
Ethybenzene 1					
1.3-Dimethybenzene / M-Xylene					
Xylene	The state of the s				
Syrene					
Chlorobenzene					
Dichlorobenzene, Norspecific	CHLORINATED AROMATICS				_
1	Chlorobenzene				
HALOGENATED AROMATICS Chloromethane 1.2 LT 1.2 LT 1.2 LT 1.2 LT 1.4 LT					
Chloromethane	1,3-Dichlorobenzene	1 LT	1 LT	1 LT	1 LT
Stornomethane					
Chloroethene / Vinyl Chloride					
Chloroethane					
Methylene Chloride					
1,1-Dichloroethylene / 1,1-Dichloroethene					
1				-	
12-Dichloroethylenes (Cis And Trans isomers)					
Chloroform					
1.2-Dichloroethane	Chloroform				
1,1,1-Trichloroethane	717777777				
Bromodichloromethane					
1.27-Dichloropropane	Carbon Tetrachloride	1 LT	1 LT	1 LT	1 LT
Trichloroethylene / Trichloroethene	Bromodichloromethane	1 LT	1 LT	1 LT	1 LT
1,3-Dichloropropane 4.8 LT 4.8 LT 4.8 LT 4.8 LT 4.8 LT 4.8 LT 1 LT <td>1,2-Dichloropropane</td> <td>1 LT</td> <td>1 LT</td> <td>1 LT</td> <td>1 LT</td>	1,2-Dichloropropane	1 LT	1 LT	1 LT	1 LT
Dibromochloromethane					
1,1,2-Trichloroethane					
2-Chloroethykinyl Ether / (2-Chloroethoxy) Ethene 3.5 LT 3.5 LT 3.5 LT Bromoform 11 LT 11 LT 11 LT 11 LT 11 LT 1.1,2,2-Tetrachloroethane 1.5 LT 1.5 L					
Bromoform					
1,1,2,2-Tetrachloroethane 1.5 LT					
Tetrachloroethylene / Tetrachloroethene					
Carbon Disulfide 5 ND					
Cis-1,3-Dichloropropylene / Cis-1,3-Dichloropropene 5 ND					
Trans-1,3-Dichloropropene 5 ND 10 ND 1 ND 1 ND 1 ND 1 ND 1 ND 1 ND 1 ND 1 ND 1 ND 1 ND 1 ND 1 ND 1 ND <th< td=""><td></td><td></td><td></td><td></td><td></td></th<>					
Acetone					
Methylethyl Ketone / 2-Butanone 10 LT 11 LT 1.4 LT	WATER SOLUBLES				
Methylisobutyl Ketone/4-Methyl-2-Pentanone 1.4 LT Methyl-N-Butyl Ketone / 2-Hexanone 1.4 LT Methyl-N-	Acetone	8 LT	8 LT	8 LT	8 LT
Methyl-N-Butyl Ketone / 2-Hexanone 1 ND					
Methyl-N-Butyl Ketone / 2-Hexanone 1 ND					
Acrylonitrile 8.4 LT Trichlorofluoromethane 8.4 LT Trichlorofl	Methyl-N-Butyl Ketone / 2-Hexanone	1 ND	1 ND	1 ND	
Trichlorofluoromethane 1 LT 1 LT 1 LT 1 LT 1 ND					
Acetic Acid, Vinyl Ester / Vinyl Acetate 1 ND 1					
Collection Date: 23-Mar-93 25-Mar-93 26-Mar-93 15-Apr-93 Extraction Date: 01-Apr-93 05-Apr-93 05-Apr-93 27-Apr-93					
Extraction Date: 01-Apr-93 05-Apr-93 05-Apr-93 27-Apr-93	ACETIC ACID, VINYI ESTET / VINYI ACETATE	1 ND	1 ND	1 ND	1 ND
Analysis Date: U1-Apr-93 U5-Apr-93 U5-Apr-93 27-Apr-93					
	Analysis Date: Notes:	01-Apr-93	ub-Apr-93	U5-Apr-93	27-Apr-93

LT = less than detection limit; ND = Not Detected

Appendix O: Investigation-Derived Waste

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This topic paper discusses the management of investigation-derived wastes (IDW) during the Remedial Investigation Addendum (RIA) and Site Inspection Addendum (SIA) investigations conducted at Fort George G. Meade (FGGM). This paper also addresses MDE and EPA comments on IDW.

The SIA/RIA Work Plan stated that only drilling spoils with a PID reading of greater than 10 ppm would be contained in drums, however, due to comments from the EPA and MDE, we contained all drill spoils. At the request of USAEC, the purge water was returned to the ground. The rationale for discharging purge water was that, for the unconfined aquifer, the ground water was shallow and the contaminants would not cause any further contamination. For the confined aquifer, discharge of purge water was conducted because, based on previous laboratory analyses, the deep aquifer was uncontaminated relative to the shallow aquifer, and, therefore, its discharge would not cause cross-contamination or further contamination.

The drilling spoils drums were labeled with site name, well number of source, contents, date collected, and number (n) of total number of drums (m) for the boring (n/m). The drums were initially stored at their source locations and were then moved onto pallets in a staging area at the Active Sanitary Landfill (ASL). The only drums not to be moved to the ASL were the drums from the Ordnance Demolition Area (ODA). These drums were not moved for safety reasons; the area will require clearance from a UXO or EOD specialist before a truck can be used to move the drums.

The number of drums collected, for each area, was as follows:

- Active Sanitary Landfill (ASL): 32 drums from MW-101D, 3 drums from MW-103, 2 drums from MW-102, and 3 drums from MW-104.
- Ordnance Demolition Area (ODA): 6 drums total from wells ODAMW-1, ODAMW-2, and ODAMW-3.
- Helicopter Hangar Area (HHA): 2 drums from HHA-6.
- DPDO Salvage Yard and Transformer Storage Area (DSY): 9 drums total from MW-200 and MW-201.
- Fire Training Area (FTA): 11 drums total from FTAMW-1, FTAMW-2, and FTAMW-3.

At the conclusion of the field program, the drums were inventoried and sampled. A representative number of samples was collected from each location by compositing materials from two or three drums, with the exception of one sampling location where only one drum was sampled. The samples were logged into the field books by their location, the individual drum, and the depth of the sample from the drum.

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Selection of drums to sample, where multiple drums were present, was a function of accessibility and the drums' contents. The rationale was to composite individual grabs from the same location to ensure that materials from one location did not mix with materials from another location. Larger numbers of samples were obtained from locations where larger numbers of drums were generated, specifically at the ASL and the FTA. For a given location, a random selection of drums was made, then individual grab samples were obtained at different depths to help ensure that a representative sample was collected. Grab samples of soil were collected using either an auger or stainless-steel spoon and mixing it in a stainless-steel bowl. All sampling and compositing equipment was decontaminated between samples.

Several drums of decontamination water were generated. Grab samples of water were collected by dipping the sample bottles into the drums. Several drums contained plastic sheeting used to construct decontamination pads or bentonite/cement; these were not sampled.

A total of five composite soil samples and two composite aqueous samples were collected for analysis of TCLP for metals, pesticides, volatile organics, semivolatile organics, and herbicides. A summary of the samples is provided in Table 1. The results of the chemical data are attached. All detected analytes were below their Maximum Concentration of Contaminants for the Toxicity Characteristic in the Federal register. The waste was not considered as potential RCRA-listed waste, or applicable for the land-ban restrictions, because none of the wells were drilled in a source area and were, therefore, extremely unlikely to contain listed wastes.

To ensure that the waste spoils were handled in accordance with Maryland's state requirements, ADL contacted Fred Keer of the Maryland Department of the Environment, Division of Waste Management and sent the attached letter. MDE provided the USAEC with approval to discard the drum contents.

References

- Management of Investigation Derived Wastes during Site Inspections, OSRR Directive 9345.3-02, May 1991.
- Guide to Management of Investigation-Derived Wastes, Quick Reference Fact Sheet, Publication 9345.3-O3FS, April 1992.
- Table 1 Maximum Concentration of Contaminants for the Toxicity Characteristic, 40 CFR 261.24.